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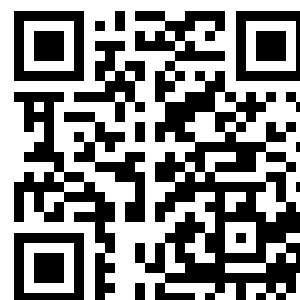


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AMERICAN BLACKSMITH

A Practical Journal of Blacksmithing and Wagonmaking

BUFFALO
N.Y. U.S.A.

OCTOBER, 1913

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Removable Calk Users! Will You Win or Lose Next Winter?

And don't say "Neverslips" and Giant Grips.
Ask for Ring Points, Rowe Juniors and Lock-Jaws.

These are days of tommy-rot and poppy-cock. Numerous glib salesmen of removable calks are trying to get business and hold their jobs in various ways.

The most popular trick this season seems to be to abuse the Rowe Calk Company and to tell horseshoers that in some far-away spot this company isn't doing what it claims.

Whenever a man tells you that, he is telling you a falsehood.

The Rowe Calk Company in selling its own goods—Ring-Points, Rowe Juniors and the entire line—and in selling Lock-Jaw drive calks and shoes, deals only with blacksmiths' supply houses.

The whole country knows our record of fairness and honesty in this respect, and we assure you horseshoers of North America that we are sticking to that policy and will continue to do so.

We made it possible for you horseshoers to get a square deal on the calk question.

Other manufacturers laughed at us and said we could not succeed without selling the shelf hardware stores.

We won by being fair. We sell more calks than any other company today in a large part of the calk-consuming territory.

That is why our competitors are sore, why they are jealous of our standing among horseshoers, why they suddenly want to be considered friends of the horseshoer, too.

But mark our words you will find the same conditions next winter as last winter and the year before.

Our goods alone will be found where they should be and the goods of the other fellows will be found in the same old places.

Our competitors have a perfect right to sell their goods as they want to.

We object only to misrepresentation as to what they and we are doing.

Play on the safe side and buy the goods of the manufacturer whom you KNOW to be square. Taking a chance may lose you a winter's business.

Of course we couldn't lead as we do today unless we had the best calks.



Golden Rustless
Ring-Point

TRIED AND TRUE, RELIABLE AND SQUARE

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HARTFORD, CONN.

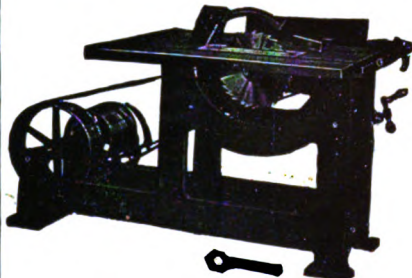


Patented Lock-Jaw

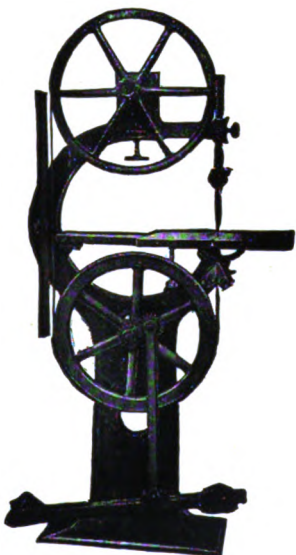
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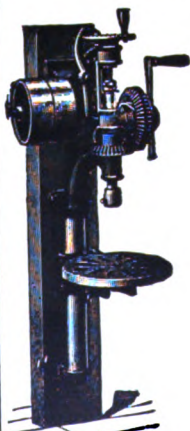
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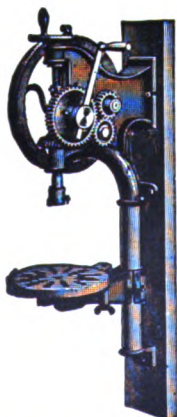
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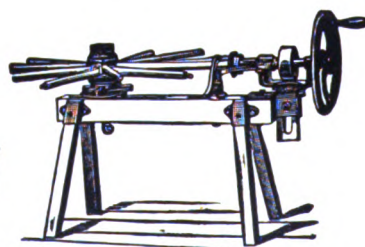
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BAND SAWS, JOINTERS AND SAW TABLES—Special loose leaves, illustrating and describing 20" Band Saws for foot or belt power or combination; 26, 32 and 36" power Band Saws with new features; also Saw Tables and five sizes of Jointers.



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Mr. Totman's Articles

Mr. H. M. Totman is a practical general smith, and owns and operates a general vehicle and smithing business in Erie, Pa. At present his shops occupy 12,000 square feet of floor space and his business returns about \$20,000 per year. Mr. Totman has spent thirty years of study and experiment in smith-shop problems in an effort to develop a method by which an owner may have absolute knowledge of the condition of his business each week and enable him to compare with similar periods in other years.

Mr. Totman's articles are not intended for expert bookkeepers, but are designed to aid the horseshoer, the smith and the owners of general custom shops. They are written from the practical viewpoint of a practical general smith and every one of Mr. Totman's articles should be filled with sound, practical pointers for every shop-owning reader.

A Forging Instructor

Beside telling how to make good forgings a forging instructor should also be able to tell a good smithing paper when he sees one. This is what Mr. Walter C. Douglas of Hampton Institute writes:

"I am an old subscriber to your paper, but since I have taken up the work as instructor at this school I have been using the copy of the journal that comes to the library. However, I find it necessary to subscribe personally to the paper, so that I can keep the back copies on hand. I find it a very helpful paper and I shall advise the students who are under my instruction to read it. Please begin my subscription at once."

Tell your neighbor about this. Let the smith who "knows it all" read this letter. Tell the chap who is "too old to learn" about this letter.

Subscription Agents

When a stranger solicits your subscription to THE AMERICAN BLACKSMITH, or any other publication, insist upon his showing you absolute proof that he is an agent in good standing and is employed by the publication which he represents. Don't, under any circumstances, give the man your money if you are not sure that he really works for the paper he says he does. No matter what the man offers you—no matter what price he makes—no matter what premium he promises to send—DON'T GIVE HIM YOUR MONEY IF YOU ARE NOT SURE.

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Business

Which:—to thoroughly know the smithing trade and to lack a knowledge of business principles, or—to thoroughly know the principles of business and to lack proper knowledge of the trade? Which is most important? Of what material value is smithcraft knowledge to the shop owner if after he has done the work he does not know how to figure costs, how to keep accounts and how to collect the money that is coming to him? A smith to be a success as a smithshop owner MUST KNOW how to keep accounts, how to figure costs, how to do business in a business way. For years some smiths have been content to keep account of things on slates, scraps of paper and most any material that came to hand. One old veteran whom we called on some time ago was found charging up a customer's account on a piece of pine board siding. When asked what he did when a customer paid his account he explained that he used the plane.

But the days for such methods are fast drawing to a close. The smith-shop owner if he now wishes to KNOW his business must know costs, selling price, profit and all about the many items that go to make his business. A slip of paper is no longer sufficient, a piece of slate is not permanent, and the system (if it may be so dignified) is not sufficiently regular as to be worth anything except as a means of keeping memoranda for present use. And that is one of the least uses to which an accounting system is put. To know your profits, your losses, your costs, you must have permanent records.

This number of "Our Journal" has much to say on the subject of business and accounting. This issue introduces a new series of articles by Mr. Totman, an experienced smith and shop owner—it tells you how important it is to be able to tell your banker all about your business—it tells you, in the story of Tom Burchard, how to make your opportunities—it tells you how to protect your business when renting, and several other phases of business and business management.

The Bowden System

And while on this very important subject of business, do not forget the Bowden System of Accounting. We are now ready to supply these outfits at an extremely low cost. In fact the price we are quoting is only just enough to cover cost and carriage charges. And with this system you will be able to take care of all your business records and accounts. If you want a simple, easy system for keeping accounts ask about the Bowden System. What you get for the price will surprise you.



Apologies to Farm Imp. News

LET THE CAT IN

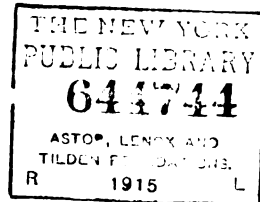
Many smiths keep a cat or two around the shop to take care of any rats or mice that may chance to be looking for a boarding and lodging place; for the smith knows that it is expensive to feed rats and mice, to say nothing of the damage caused by these pests. Yet many of these same smiths seem to ignore the fact that the rats of Cost Ignorance and the mice of Old Time Methods eat more and damage more of their Business Profits than the real rats and mice. Get a cat. Name her Cost Accounting and Business System. She will keep your business premises clear of Cost Ignorance and Old Time Methods. She will protect your Business Profits.

Will You Let the Cat In?



How I Put My Business on A Solid Foundation

AS TOLD TO THE EDITOR



I HAD the usual apprenticeship—a start under an old-fashioned New England general smith where I served two years; six months with a big machinery firm in a big eastern city; and then a wandering about for five or six years with occasional stops of from one week to ten months through most of the Northern States. Finally, after two unsuccessful attempts to establish myself as a shop owner in as many small towns, I came here, rented a shop from an old veteran and prepared to make business hum.

Conditions here were just exactly as they were in thousands of other towns. No harmony among the craft, no recognition among the shop owners, nothing but one continuous session of price-cutting and business-fighting. The old smith from whom I rented the shop told me all about conditions in the town and gave me many hints and suggestions on just how to meet conditions.

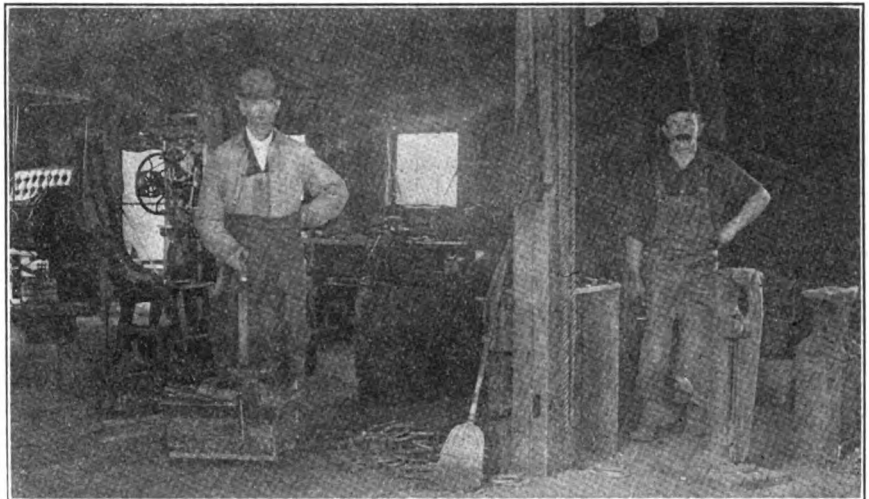
Competition was keen. The several shops seemed determined to get the business at any cost; and all of the smiths seemed bent upon one resolve—to put every other smith right out of business.

When I took hold I decided to build up a business upon the solid foundation of quality and fair price. I decided that I would make my own prices

and not be dependent upon my competitors. I decided that when Farmer Brown asked my price on a repair job and I said \$7.50—that would be the price, even though Brown said that Jimson, my strongest competitor, would do the same job for \$6.50.

You must admit that by trying to build a business on this basis I was

After I had been working along for a few months I began to wonder how the other smiths arrived at the prices they quoted and worked for. I had no real system of pricing, myself, but they evidently had less system than I, for some of the amounts they gave out as selling prices appeared more like bare cost figures



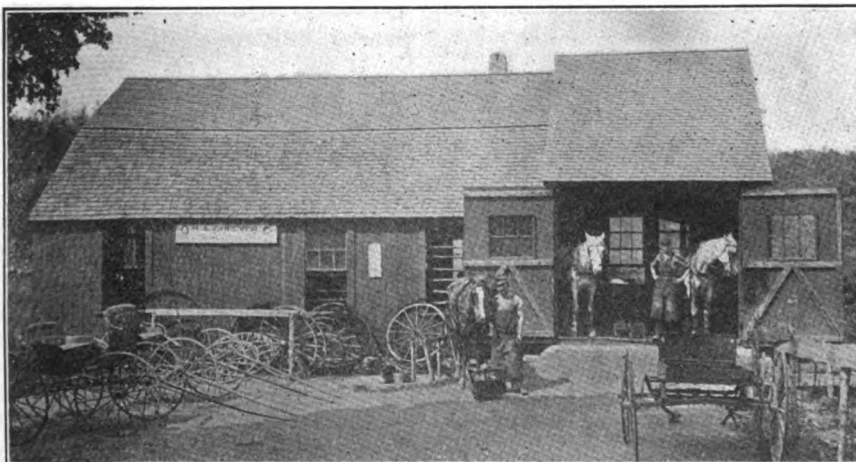
THE GENERAL SHOP OF MR. HERBERT A. CHEEVER OF NEW HAMPSHIRE

cutting out a pretty stiff job for myself; and before I had been in active business for one month I knew I was going to have a hard time of it; but I was determined to put my ideas into effect.

without any additions for profit or expense. I therefore determined that I would know just exactly what everything cost me; not only what I paid for material and stock, but what it actually cost me to do the work, to carry on business and to keep my place up to date.

My knowledge of business was made up of such snatches as I picked up from time to time on my travels from shop to shop. Few if any of the smiths I worked for seemed to have a very good idea of what a real accounting system was; and when I asked my friend, the veteran smith from whom I rented the shop, how to go about establishing a real smith-shop business system he pointed to the old daybook and ledger and said:

"Them's did me for thirty year, boy. Seems es tho' they'd do fer you, too."



'MID THE HILLS OF OLD NEW HAMPSHIRE—MR. CHEEVER'S WELL BUILT SHOP



But I told him they wouldn't, and that if he would give me the value of his long experience I would try to work out a system that would really say something when you came to it with a question.

I accordingly began to ask questions of my old friend, of the salesmen who called and of some of my fellow townsmen. I had heard something of overhead expense, but didn't exactly grasp what it meant. One salesman whom I asked said it "was

After much figuring and after repeatedly correcting false figures I found that my cost of doing business was 20%, based upon the business I was doing since I started; and as I looked over my figures, and found that at last I was to all accounts on the right road to cost knowledge, you cannot imagine how I felt. Mentally I already saw my name as the foremost business smith of the century—the business life-saver of the craft. When I made a price on any job I

stuff you are giving him, and then show him the right and also the wrong way to do a job, he will 99 times out of 100 pay you your own price and thank you for giving him the best job. At least that has been my experience.

But to get back to this cost system: I kept on with my "20-plus-10-equals-30% system" until the end of the year. I say until the end of the year because at that time my year-end figures showed that something was



FROM FIGHTING—

Are you still trying to club your competitors to death?

the total of all costs except the cost of your goods and stock."

Figuring along this basis I listed my overhead expense as a total of rent, helper's wages, light, heat, fuel, insurance, interest on the investment, wear on equipment, and stationery. I am frank to say that I did not figure all of these items as overhead until I had talked with quite a number of salesmen and town merchants. My first list of overhead charges was much shorter than this and did not include interest on the investment, wages nor insurance. I did not think of wear on my equipment at all until one salesman for a manufacturer asked me how much I was tacking onto each job to pay for my equipment. That set me to thinking correctly, so that finally I compiled a list of fairly correct charges to come under the head of cost of doing business,

never forgot my 20% for overhead and 10% for profit—30% in all—and thus I made certain of expense and of a fair profit.

But this, of course, didn't eliminate competition. It didn't keep Jimson from quoting his usual \$6.50 on a job that should bring at least \$7.25, according to my cost system, and above all it didn't keep customers from going to Jimson with their work.

Naturally, I didn't allow work to go on down the street without a protest, and there was really little profitable work that went elsewhere when I had a chance to tell a customer something about costs and the kind of work I would do for the price I asked. When you come right down to brass tacks with a customer and show him just how much you are asking as a profit and what kind of

wrong. I was doing a business, in round numbers, of \$10,000 a year, which was not so bad, after all, BUT, I found that beside my wages as my own boss at \$15 per week or \$780 for the year I had cleared but a little, measley \$210 instead of the \$1,000 that I had figured on. I was certain there was a big leak somewhere, and for a long time it seemed to evade every possible line of investigation I might pursue. Finally the thing got so on my nerves that I decided to figure the thing out once and for all time, and succeed—or fail, and simply keep on in the blind old way of making prices on guess.

I got out my books (for about the hundredth time it seemed) and figured up the net cost of supplies for the year. Upon this basis I was about to figure profits, expenses and the like, as I had always done, when it



suddenly dawned upon me that I was starting out wrong. When I laid down my figures for getting a profit basis upon which to calculate I figured upon gross business—upon the total amount of business I had done. Now I was trying to figure, and had through the whole year figured, profits and expenses on the basis of cost.

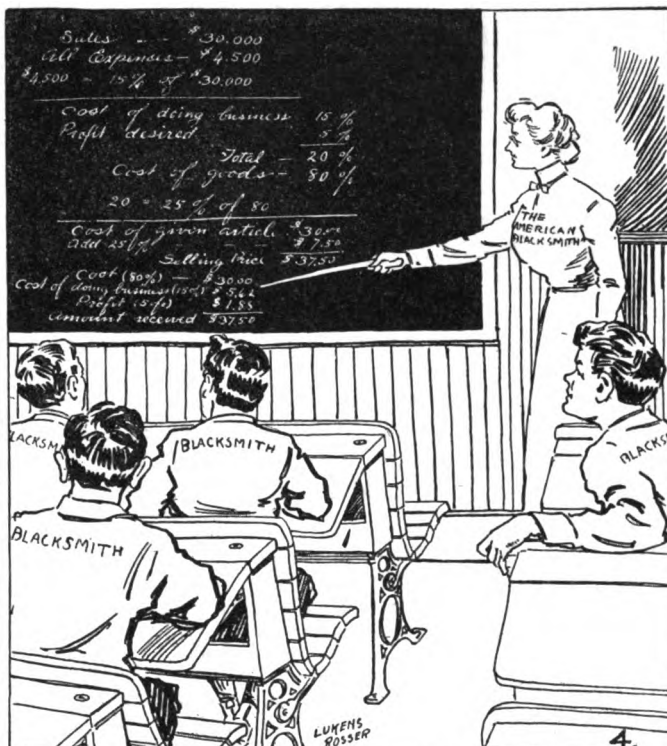
My head nearly swam in the whirlpool of facts and figures that now crowded my brain. Here I

sidering the cost price as 100%, I figured on the basis of selling price as 100%. This, of course, with 25% for cost of doing business and 10% for profit, made the cost price equal 65%. Thus, if \$1.00 equaled 65%, or the cost of a piece of work, to do business on a profitable basis I would have to get \$1.55. Expressed in dollars and cents—\$1.00 is the cost price; 39 cents the overhead cost, and 16 cents the profit.

It was real, hard work that showed

against it, it may go so far as to wholly ruin him. There is a way of protecting himself at least in part, and a comparatively easy way, and it is the object of this article to explain the entire situation.

The case to which I refer was this: Up to about six months ago the man in question had occupied one building upon a long lease, for about fifteen years. His business had been built up there, and was therefore associated with that location in a way which



—TO FIGURING

Apologies to Farm Imp. News

Better get together and figure—The American Blacksmith will show you

was figuring both ways in an attempt to make a profit, and barely coming out even, all because I did not realize that a percentage of a small sum was less than the same percentage of a larger sum.

In other words I had been adding 20% of my net costs as overhead expense, notwithstanding the fact that I had in the beginning figured my overhead expense on the basis of total volume of business. I called myself all kinds of fools the night I stumbled upon this solution!

After that I figured for days, disregarding all previous percentages, and going about my price, profit and volume figures on a plain, sound basis. The first thing this new basis showed was the fact that my cost of doing business was nearer 25% than 20%. Then, too, instead of con-

up this method as correct, but it was with a great big sigh of relief that I finally adopted this basis as the right foundation for making prices; and you may be sure that the end of the next year was awaited most impatiently so that I could prove whether or not my system was right. Of course it proved up, and this pricing system has enabled me to put a neat and tidy sum into a private bank account, regularly.

Protecting Your Business When Renting

A few months ago a business man was confronted with a matter which may arise in the experience of any man who rents his place of business. If he has not protected himself

invariably makes the location an asset.

The building was to be torn down and a new one built for another purpose, so the man was notified to remove. Removal was somewhat of a problem, as the location was a choice one, and was already much crowded. Vacant places were at a premium, but by a piece of rare good luck, he was able to find a location within half a block from his old stand. That, however, was literally the only vacant place available within a radius of several squares. He signed the lease at once and drew a huge sigh of relief when the landlord agreed to give him a five years' tenancy.

Moving and refitting the new place cost the tenant a considerable sum, but he was glad to pay it under the circumstances. He had been in there



only about five months, when he was advised that somebody who held a mortgage on the building, on which the interest had been allowed to default, had begun foreclosure proceedings. He at once saw the landlord, who admitted that he was in serious

financial difficulties, and could do nothing; he would be obliged to let the property go, as the mortgages and other liens against it would eat up practically its entire value.

ment creditor issues execution and sells the property. As soon as the property passes into other hands, the lease is ended and the new owner can take possession at once.

That was exactly what happened in the above case. The mortgage

not give the tenant any notice to remove. He can insist upon immediate possession.

How can a tenant protect himself against such a fate? In many cases he can protect himself absolutely; in some cases he cannot. When a business man is contemplating renting a property, particularly when so much hinges upon it as in the case I have related, he should examine the records to see whether there are any mortgages against the property or any judgments against the man who owns it. If there are, he should go to the mortgagees, or the judgment creditors, and request them to sign the lease with the real owner. If they will do this, it means that if execution is issued against the property by any of these, and it is sold while the tenant occupies it, *and the mortgagee or the judgment creditor himself buys it in*, as very frequently happens, the tenant cannot be ousted until the end of his lease, because the new owner has signed that lease. Of course this method of protection will not serve in every case, because often the property will not be bought in by the mortgagee or the judgment creditor. It will go to a stranger, who has not signed the lease, and he can oust the tenant at once. This, however, and the refusal of some mortgagees or judgment creditors to sign the lease, are the only contingencies against which the plan will not protect. It is therefore eminently worth trying.

The tenant is fully protected against judgments and mortgages dated after the lease, because he cannot be ousted through them. It is



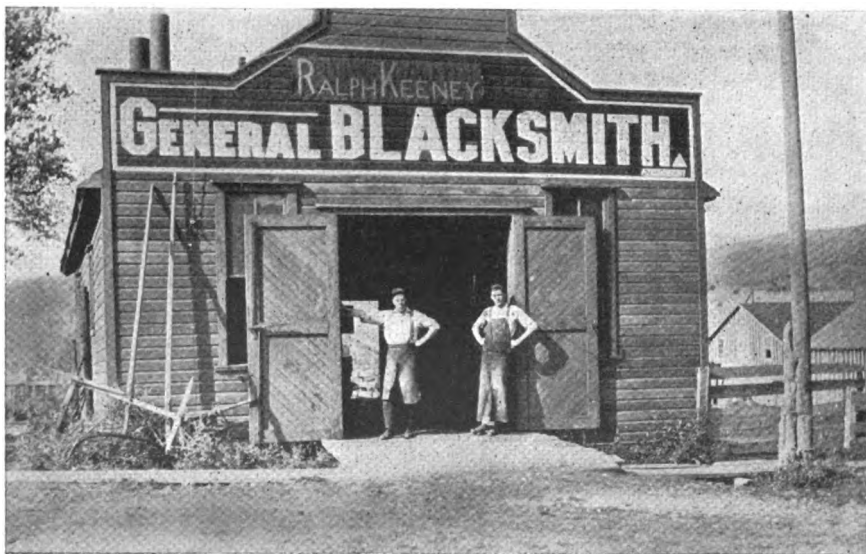
ALL THAT REMAINED OF AN OMAHA SHOER'S PROPERTY AFTER THE BIG TORNADO. PROPERTY OF MR. CHAS. O. HOFFMAN

The property was sold at foreclosure sale, all efforts to stave this off having failed. It was bought in by a competitor of the man renting. The competitor at once served notice on the latter that his lease was at an end, and that he should vacate within thirty days. And the latter was obliged to do it, for under the law there was no way he could escape. At the present time he is in a small and highly undesirable place on a side street, where he is trying to hold his business together, but with almost all his former large transient business gone.

It is fundamental that when real estate which has been leased is sold at *private sale*, the buyer takes it subject to the lease. In other words, A owns a property which he leases to B. Before the lease expires A sells it to C. C. must allow B to stay out his lease. The law is entirely different, however, where the sale is on foreclosure proceedings, or on execution, or something like that. In such a case, if the mortgage or the judgment on which the sale was held was against the property when the tenant signed the lease, he can be ousted if the mortgage is foreclosed while he is in there, or if the judg-

which was foreclosed was dated two years ahead of the tenant's lease. In addition there were several judgments entered before the lease and execution could have been issued under any of these, the property sold and the tenants ousted. In other words, he took his five years' lease subject to the right of at least six people to do something at any time after he moved in, which would oust him. Of course he knew nothing about this chance when he signed the lease, though he could have known.

To make this situation worse, the new buyer in a sale of this sort need



THE GENERAL SMITHY OF MR. RALPH KEENEY OF COLORADO



only against mortgages, judgments and other liens dated *before* his lease that he is helpless.

I should also say that when a sale under a mortgage or judgment is held and the owner himself buys it in, the lease is not affected; the tenant can still hold on, for while the buyer is a new owner, strictly speaking, he is also the former owner, and the law does not consider it equitable that he should disown his own lease.

(Copyright by Elton J. Buckley)

The Business from a Practical Smith's Viewpoint

H. M. TOTMAN*
Does It Pay?

These articles are not meant for expert accountants or bookkeepers, but are designed to aid the small business men (horseshoers and smiths and the general custom shop) who have not had the opportunities of a business training. Those who are familiar with the conditions in custom shops for the past thirty years realize how very few ever make more than a fair living, and perhaps by constant industry and economy accumulate a few thousand dollars, but in no way compared with the rewards gained in other industries using the same application. Why so? We shall endeavor to answer this question and suggest a remedy.

We will consider the following subjects:

1. Does it pay?
2. How to charge.
3. Leaks and their remedy.
4. System and credit.
5. Bookkeeping methods.
6. Trade organization.

We shall endeavor to be just as practical and clear as possible and will gladly answer any questions bearing on the subjects treated if writer will enclose a stamped addressed envelope.

First: Does it pay? This is the vital question. Its answer indicates the success or failure of any business enterprise. To properly answer it necessitates another question:

*Mr. H. M. Totman was born in 1853 in Connecticut. He learned the carriage trimming trade in Western New York. Employed for twelve years in various parts of Ohio, Kentucky and New York. Began business in 1883 in Meadville, Pa., building high-class light road vehicles. In 1893 he removed to Erie, Pa. With the advent of the automobile Mr. Totman ceased building new work except on order and devoted all his attention to repairing and repainting automobiles, carriages and wagons and general smithing. His business returns are about \$20,000 per annum. At present his establishments occupy 12,000 square feet of floor space with a proposed, two-story addition of 45 by 130 feet.



THE SHOPS WHERE MR. GUS CARLSON OF GEORGIA DOES A GENERAL SMITHING BUSINESS

What is a paying business?

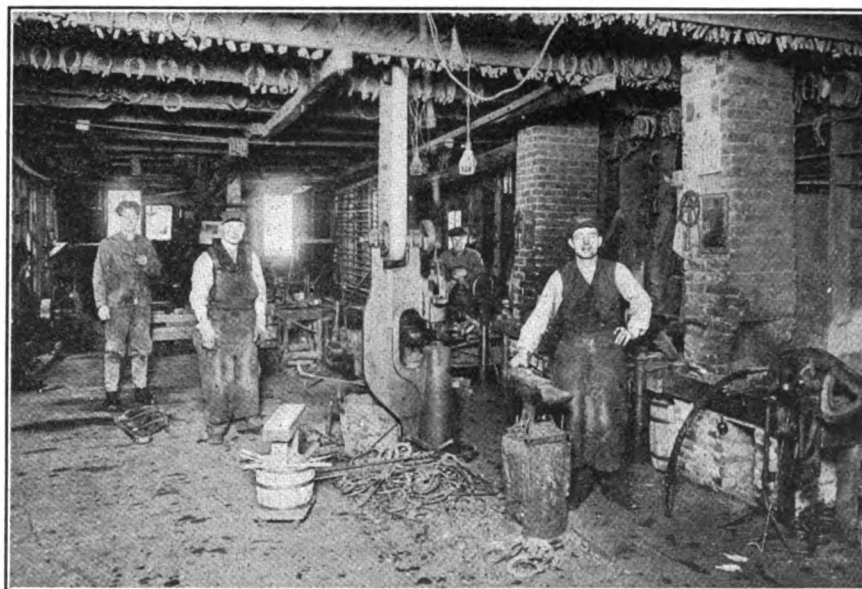
We define the above as meaning that after deducting the cost of material used and labor employed, together with a sufficient amount to cover the overhead or fixed expenses, there remains an adequate amount for the return of the capital invested. The first two—stock and labor—are simply figured out. The third—fixed expense—is one upon which men differ; and we are quite sure it is the rock upon which most business craft is wrecked; and yet it is just as much a part of the cost as are the spokes you put in a wheel or the shoes on the horse.

Does it pay?

In an up-to-date factory or shop it is recognized that cost-accounting

is just as important and necessary as sales-accounting. We think it more so, because without the exact knowledge of cost how are we to be certain of any profit? Where competition is keen and margins necessarily small this is certainly an important point to consider.

The personal factor is of importance in small shops where the employer is on the same social plane as his employee, and is acquainted with his family and circumstances, which is impossible in the great factory with its thousands of employees. We fear the discontinuance of the old apprenticeship system and the sort of close relationship of boss and cub which has been conducive to the best interests of both.



THE INTERIOR OF MR. CARLSON'S SHOP



Skilled all-around workmen are getting very scarce. The few remaining are mostly old men; and in the course of nature it will be but a few years when they will all have passed away. Then where will we find the smith who can do anything, from the shoeing of a horse, building a carriage or making a difficult forging? Or a woodworker who can build and repair a wheel, put a back panel in a coach or make an axle for a wagon with the proper set and gathers? It requires a higher degree of mechanical skill and experience to become a first-class repairman than

stock—shafts, rims, spokes, etc., or in the trim shop will buy cheap leather, union cloth, light weight rubber, etc., and it is the same where the boss is a woodworker or trimmer.

This is false economy; and good reliable standard stock is cheapest in the end. A trade built upon high quality of work is the only one that can be depended upon. Price-cutting is a confession of inferiority.

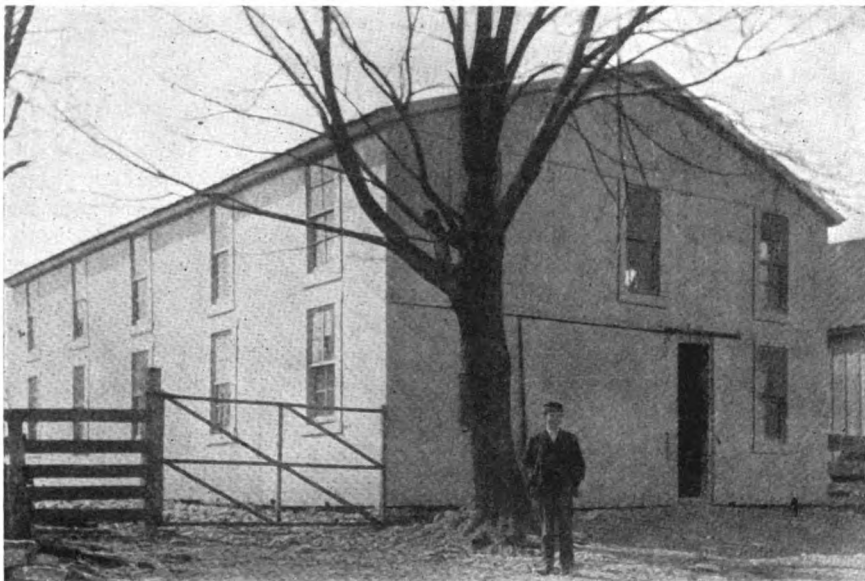
Trade is divided into two classes, namely: Those who desire reliable work and are willing to pay a fair price for it and those who consider the price only. The latter are the

shops. First; the ones who carry on horseshoeing, exclusively, and generally found in large towns. Second: The repair shops doing wagon repair work with an occasional job of building to order, but no shoeing. Third: The combination shop, doing both kinds of work.

The writer's experience has been with the latter two, but the methods employed (to be given later) are applicable to all three kinds of shops.

Some one has said: "It takes as much brains to make a first-class mechanic as to make a president." Although this may seem an exaggerated statement, nevertheless it is undeniably true, and the wonderful progress of the past century was due far more to the efforts of the skilled mechanics (the men who as Beecher once said: "Have brains in their fingers"), the men who worked at the bench and forge, than to any other single class of citizens. And thanks are due THE AMERICAN BLACKSMITH and similar trade papers which have been instrumental in awakening an interest that will enable those "sons of toil" to profit in a greater degree than ever before from the result of their labors.

(To be continued)



THE GENERAL SHOP OF FORTNER & LUSBY IS WELL EQUIPPED WITH POWER MACHINES

it does to build new work, because the former must have the originality to adapt himself to new problems constantly arising and be able to solve them correctly, more especially since the automobile has become such a factor in our business.

Would it not be well for us to take a few likely boys and give them a chance to learn these trades and thus provide for future needs? Manual Training Schools do not make finished mechanics, although of great value in determining the bent of a boy's talent. While good mechanics are of great importance in making a shop pay, good material is also just as necessary. Many repair shops make the mistake of always purchasing the lowest priced stock, and this is very apt to be the case where the proprietor is a mechanic. A smith will get good bolts and good stock, but will buy inferior wood

undesirable ones in whom there is little profit. Another bad feature of price-cutting is the fact that it establishes a bad precedent. It is much easier to drop in price than to advance prices.

Men differ upon the percentage of profit to be sought, but we submit that it should be fully 10% on the total volume of business. In other words, a business of \$10,000 per annum should net at least \$1,000. The capital required for such a business would not exceed \$5,000; therefore, the net profit would be 20% on the investment, which is very good, indeed, and very few large enterprises realize this return of percentage. We also venture the assertion that very few of the custom shops throughout the country can make a showing of that kind.

There are three kinds of shops which we will designate as custom

Accounting Good at the Bank

A. M. BURROUGHS

Editor's Note: In this article Mr. Burroughs explains the necessity of keeping accounts that will enable a man to prove to his banker that money can be "taken out" of his business when put in. Mr. Burroughs talks right from the shoulder and some of his statements are right to the point. Of course the smith who keeps accurate accounts is never embarrassed for lack of capital, for he can furnish proof that the money will be paid back when required. But—what are your replies to Mr. Burroughs' questions—the ones printed in italics?

Henry Johnson was a small smith whose specialty was expert shoeing and general repairing.

His trade increased under the stimulus of right methods and new men were employed. Finally his business reached a point where much larger quarters and better facilities were necessary.

He kept his own books, consisting of a daybook and a ledger, and didn't see a need for anything better.

The time came, however, when more credit was needed to meet the demands of his increased business. He went to the bank to seek an accommodation.

His banker asked him for a statement of his affairs. Of course he was unable to give a satisfactory



statement and the loan was deferred.

This was a rather rude awakening to the necessities of his business. He took the banker's advice and called in an auditor. The auditor told him that it would be necessary to adapt his system of accounts to meet the changed conditions of his business.

His single-entry books had been all right to start with, but they were now too incomplete. The completing entries must be made at frequent and regular intervals.

Additional accounts had to be opened and the books kept in such a way that he could know at all times just where he stood.

In short, he needed to know as much about his *big* business now as he *was* able to know about his business when it was *little*.

The auditor's advice was followed. The system recommended was installed, and a competent bookkeeper was put in charge.

Mr. Johnson soon realized that he could now do what he had long desired to do—branch out. It was no longer a necessity for him to be constantly on the job to know what was being done.

He has long since ceased to be the sort of man the bank says "No" to. He knows the detail facts about his business so well that his bank has all kinds of confidence in him.

"There are lots of business men who don't really know much about their business—bright, industrious, business men," said a banker.

"There's a popular notion that a man may be expected to know his own business. As a banker, I've grown skeptical about it.

"A man may be at his desk every day and not really know what's happening in his business.

"The thing that shows whether a business man's request for credit is right or not is the statement he shows you.

"Most banks now use special forms and reports that enable us to know the direction in which most of our prospective customers are going."

Every smith keeps some kind of records. But most of them keep accounts which *don't* account.

Some smiths neglect to keep complete records because it costs money, *but they pay for the records anyway*, whether they keep them or not. In fact they pay most for the records they *don't* keep.

Doing without a thing which is *needed* does not save its cost. It always costs more to do without a thing which is really *needed* than the thing itself would cost.

W. D. Simmons, head of the great Simmons Hardware Company, tells the story of a smith who went broke because he failed to realize the importance of being able at any time to show his creditors just how his business stood.

He didn't keep proper records of the details of his business. When he got into a close pinch and needed credit or additional capital he couldn't show his banker or the supply house any good reason why they should have confidence in him.

Things had gone so far before he really knew the conditions. he was facing, that he couldn't possibly save himself. He was broke before he knew it.

"In talking with him, afterwards," said Mr. Simmons, "I found that he had thought if he kept track of his invoices until they were paid, so as to know how much he owed and to whom, and kept a record of the amount of money different people owed him, that was really all that was necessary.

"Any records other than those, he thought, were 'foolishness,' and just made extra work."

That is why so many smith shops can be bought—why only a bare 5% of all smiths really make a success of their business.

That is why so many of them, like the man Mr. Simmons tells about, are unable to get credit in a pinch.

As a test, could you prepare a statement of your business on short notice that you, as a banker, would be willing to loan depositors' money on?

Could you produce a statement of your business in 24 hours that would convince a cold-blooded, hard-headed creditor that you really knew your business?

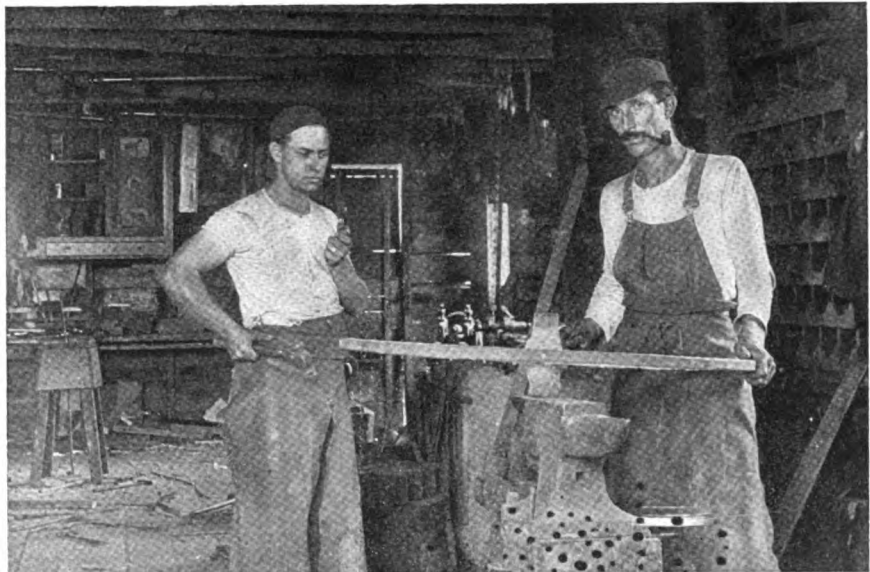
If you can't, you may come down to the shop some morning and find the sheriff ready to sell you out to satisfy some fool creditor to whom you can't *prove* that you are making money.

Storms break very quickly, sometimes. Be ready for yours when it comes.

(A Chapter from *A Better Day's Profit*. Copyrighted by Burroughs' Adding Machine Company)

Hand-Forged Work of the Fifteenth and Seventeenth Centuries

The hinges, door pulls and knockers in the accompanying engraving are examples of Gothic ironwork of the fifteenth century. Some of these



A PAIR OF OHIO SMITHS—MESSRS. SWANK & SMITH

Every smith has an accounting system that *he* considers sufficient for his business. Most of them even think it is the *best system that could be designed* for their business.

designs are rather crude, while others are very artistic. For example, the hinges in the upper half of the engraving—these are very crude in design. The work is well executed,



however, and not a hammer mark is apparent. The little fan-shaped piece just below the title card is very artistic, finely executed and shows excellent design. The two large hinges in the center of the lower half of the engraving are very good design and show excellent workmanship. They are very similar in treatment, though the scroll designs are very different. The knockers and door pulls are very artistic. Present day forgers of door hardware may follow these designs with the assurance that they will meet with approval; providing they can copy them.

The other engraving shows several hinges of the late renaissance of the seventeenth century. These show still different treatments. The hinge just above the title card is very well executed.

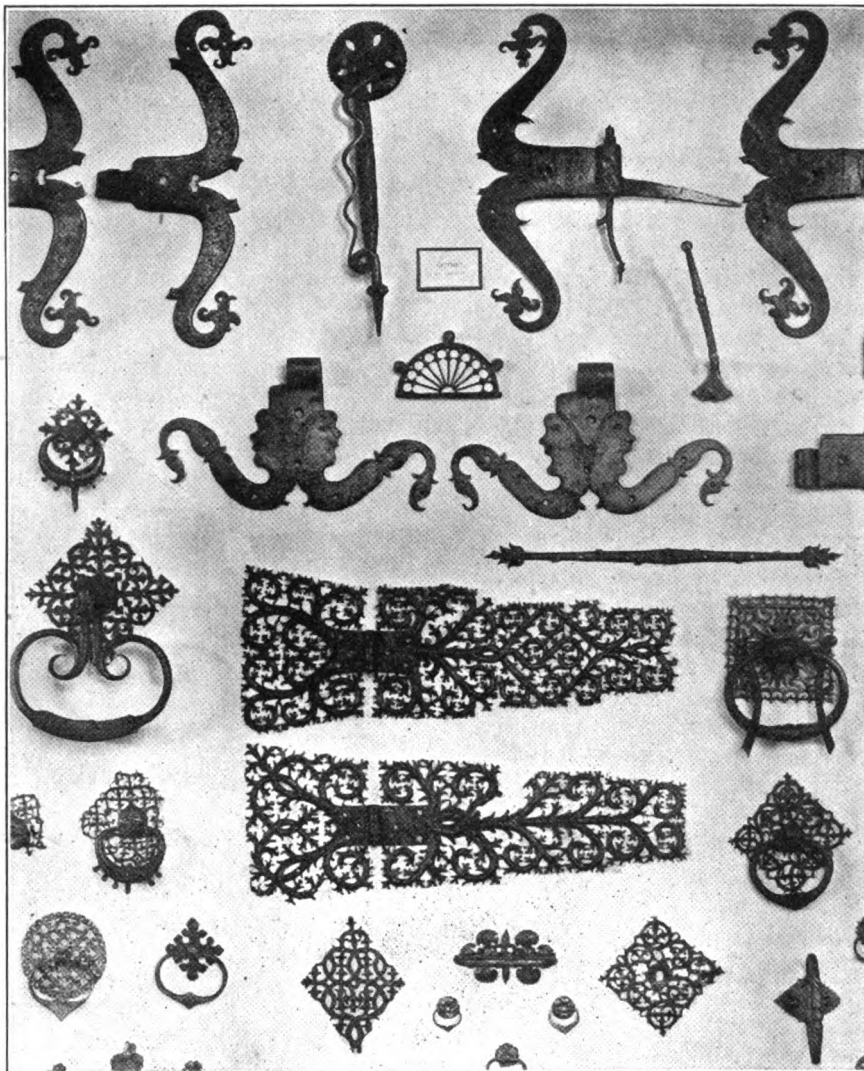
What Tom Burchard Found

It was rather an odd happening—but then fate, fame and fortune have an odd way of working at times, and what happened to Tom Burchard is a good example.

Tom Burchard was the owner of a smith shop. This shop was of the usual type—it wasn't large, and as Tom took care of all of his business alone the business wasn't large either. In fact Tom could have taken care of more business without working overtime. He had a fairly good equipment, had a small gas engine that ran a drill press, an emery wheel and one or two other machines. And besides doing a general business Tom Burchard handled several side lines. He carried a small stock of axle grease, whips and such small miscellany, had the agency for an implement line, a cream separator, and during his spare time he made an occasional incubator in his wood shop.

Still Tom complained of business as being poor. "Everybody goes to town to buy his supplies and I guess it's up to me to pull up stakes," is the way Tom put it.

And so matters seemed to be getting worse instead of better, and at the time Charley Foster of the Central Supply Company called Tom Burchard was seriously thinking of moving to a new location—"So far from this Cheap-John, penny-pinch-



SOME FIFTEENTH CENTURY FORGINGS THAT ARE EXCEPTIONALLY PLEASING

ing county that it'll take two post cards and a special delivery stamp to reach me by mail,"—ended Tom in his tirade.

"I don't suppose anything would hold you here, Tom," began Foster, "and yet when you came here three years ago you could see American Beauty roses growing where now you see thistles and burdock. The trouble with you, Tom, is that you haven't tried to drive your business. You can't expect a business to grow unless you work for it. The idea of sitting on a keg and waiting for customers to come to you is an old one. And then when they do come you hand out what they want and go back to your keg."

"But what can I do?" asked Tom. "I've tried calling on the people around here. I've solicited orders for work, for shoeing, for implements, yes, and I've gone after incubator business, too, but I've always met

with the same old song 'not in the market'—or 'don't need anything today.' And I've heard that so much that I'm sick and tired of the whole blamed business."

"Well, that is discouraging," agreed Foster, "but I still maintain that you have not grasped all of your opportunities here. You are located outside of town on the main road between town and the best farming district in the state. You see the farmer before anyone else has had a chance to see him, talk to him, or take his money from him in exchange for goods. Now, what better location, what better advantage do you ask?"

"That's all very well to hear you say it," returned Burchard, "but it ain't what—"

Further conversation was drowned in the noisy approach of a wagon which stopped before the door of the smith shop.



"Hullo there, Tom!" greeted the driver from beneath a broad-brimmed hat. "How's business?"

"So-so," returned Tom, walking out toward the wagon and shaking hands with the driver. "S'pose yer going to town with thet load?"

"No, I ain't really got to go to town a' tall," replied the farmer. "The load goes over to the canning factory but I thought that as I was so near to town I might as well stop over t' Harding's an' get me one o' them there cream separators—the wimmen folks is pretty strong fer gettin' one o' them there separators an' so I ses I'd get one today."

At the mention of cream separators Charley Foster, who had so far taken no part in the conversation stepped forward. "What make are you thinking of buying?" questioned Charley.

"Oh, I ain't really thought o' that," replied the farmer. "But I understand some good makes are offered on trial—I think I'll try two or three machines before I put down any money."

"Have you ever seen the Valley Queen Separator?" questioned Foster, mentioning the separator that Tom Burchard sold.

"No—never heard of it," returned the farmer. "Is it a good one?" he asked.

"If you'll come inside," said Foster, "I think Tom can show you one—you know Tom's the agent for Valley Queen Separators, and from what I know about things in general that Valley Queen is the real thing in the separator line."

On coming in and viewing the machine the farmer said: "I didn't know you handled separators, Tom. Must o' just got this in?" suggested he.

"Yes," agreed Tom, weakly trying to hide his embarrassment from Foster who was explaining the good points and mechanical features to such excellent advantage that the farmer finally said: "Well, I'll take that machine. It looks to me like the machine I want. I'll stop in on my way back from the canning factory."

When the farmer was out of hearing Tom Burchard said: "Well, Charley, I'll admit that was pretty clever but it can't be done every time."

"No, perhaps not," agreed Charley Foster, "but you've got to keep at

it all the time so as not to let one single chance get by."

Just then a buggy stopped in front of the shop and a woman alighted.

"My horse has thrown a shoe, Mr. Burchard, can you fix it for me right away, I'm on my way to town." And the woman handed Tom a horseshoe with several nails still hanging in the nail holes.

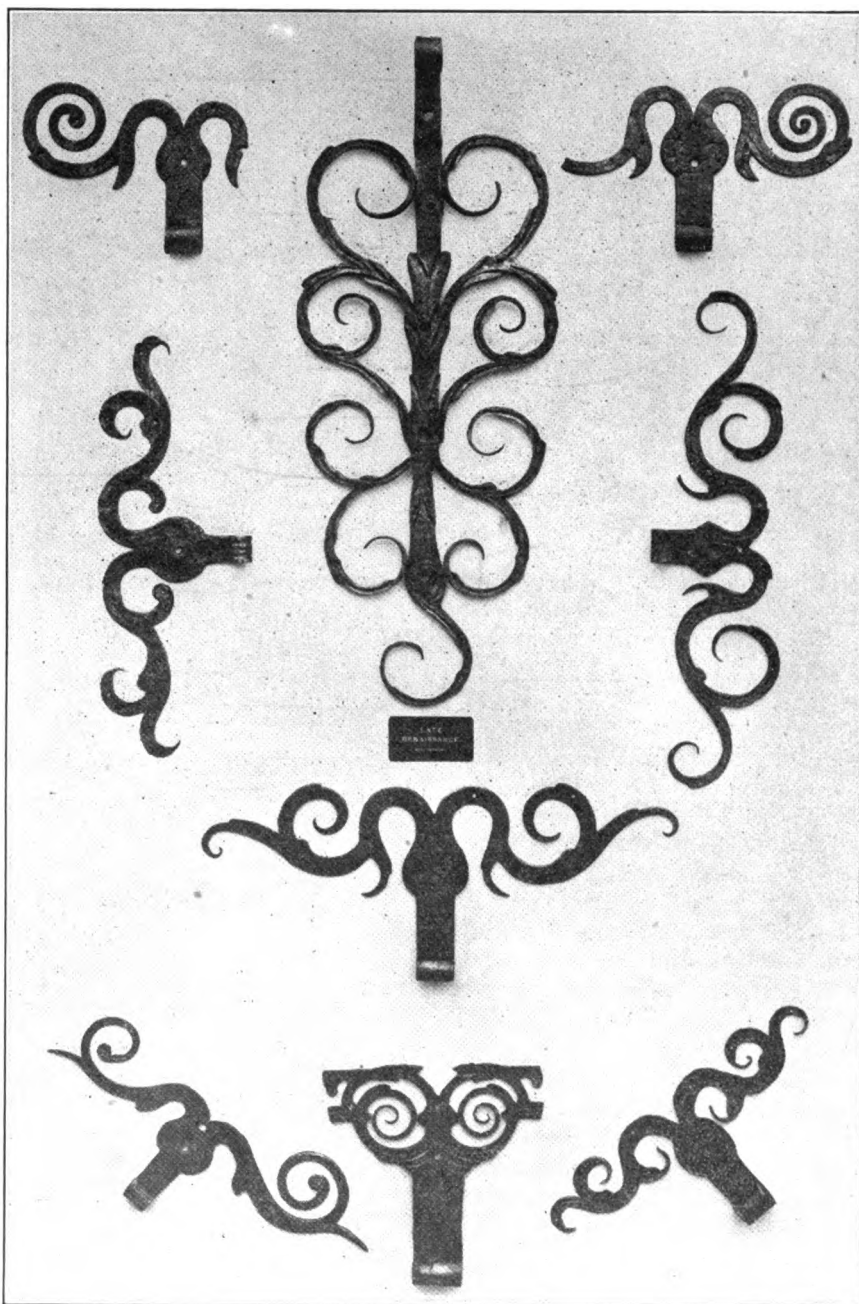
"I'll get at it right away, Mrs. Blake," and Tom took the old shoe and prepared it for reattaching to the animal's foot.

When Tom had gone out to nail the shoe on, Charley Foster, addressing the woman, said: "How are

things over your way, Mrs. Blake? I'm a friend of Mr. Burchard's and occasionally drop in to see how he's getting on and of course I'm interested in the surrounding country. I suppose land must be quite valuable in your section?"

"Yes," she agreed, "crops have been good and they're getting pretty good prices on most everything and of course that makes land quite valuable. Of course, I'm not so interested in the crops as I am in my chickens. But crops are good and everything points to a good year."

"Do you raise many chickens?" questioned Foster.



A FEW EXAMPLES OF THE ROUGHER WORK OF THE SEVENTEENTH CENTURY



"Yes—I've got quite a number, but I'm planning on still more; that's why I'm going to town now. I want to look at some incubators and things so as to increase my hatch. I understand that incubators work pretty well these days with all the regulators and things they have on them."

"Any idea what kind of an incubator you want?" asked Foster.

it and no doubt you'll get one better than some of these here machines turned out in a factory."

Just then Tom returned with his shoeing box. As he set the box down Foster said: "Tom, show Mrs. Blake that incubator you've got back there. Mrs. Blake is very much interested in chickens and I think she'll be interested in your latest model with that safety regulator."

Tom Burchard, "and I think that I must be blind. It's not the location that's at fault," continued Tom, "it's myself and I am going to change that fault from now on and at every opportunity. And to partly pay you for what you've taught me today, Charley, you're coming over to dinner now and show me some more stunts this afternoon."

And Tom Burchard made good on each and every promise.

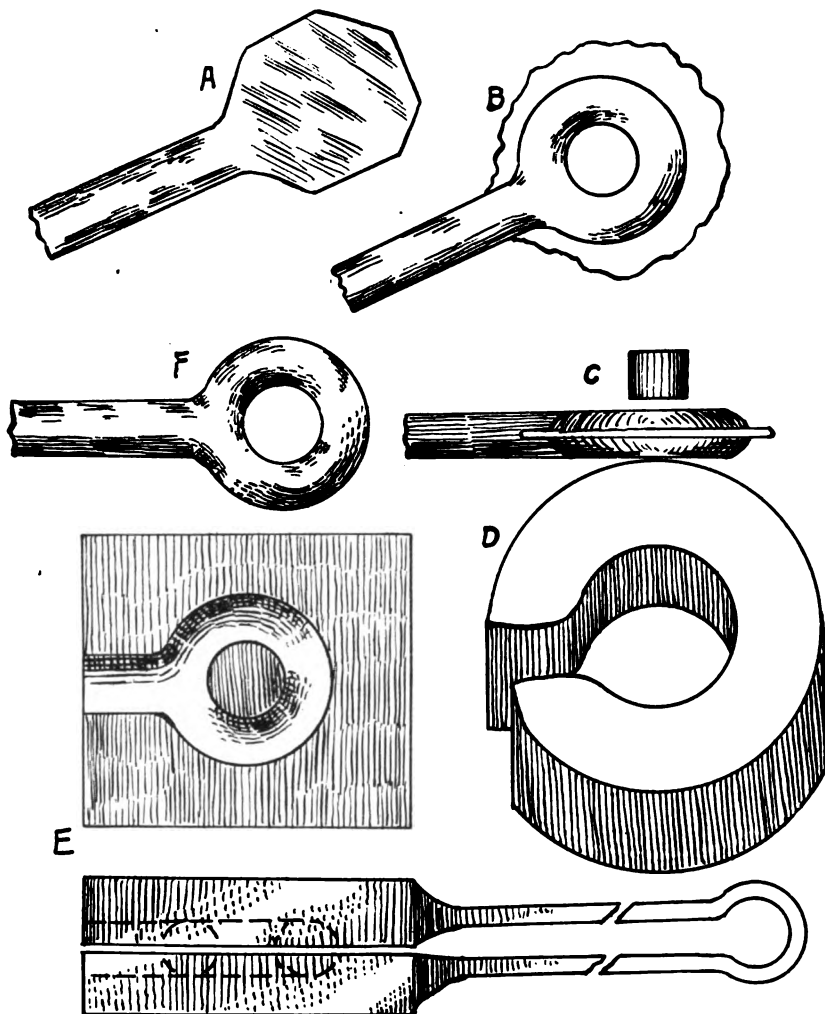
Making Eye Bolts Under the Steam Hammer

BERT HILLYER

A quick and neat way to make eye bolts from the solid is shown in accompanying engraving. The tool shown is to be used under the steam hammer. The old way was to forge a ball with a stem on it. The ball was flattened out, the hole punched, and the eye bolt thus formed was then put into a tool, as shown in E, in order to shape and smooth it up. While this method made a good job, considerable time was taken to make the piece fit properly into the shaping tool.

For instance, we will assume that the eye bolt F is to be $\frac{5}{8}$ -inch stock with hole $\frac{3}{4}$ inch inside and 2 inches outside of eye. To make it, take a piece of $\frac{1}{2}$ -inch by 2-inch iron or soft steel and forge a stem $\frac{5}{8}$ -inch thick onto it, and cut off as at A. This leaves a flat blank, $\frac{1}{2}$ by 2 inches, with the corners trimmed off. This blank is then brought up to a nice heat and placed in the tool E. This forms the piece as at B, with a fin about $\frac{1}{8}$ inch across the center and outside. The eye bolt is then placed on top of tool D which has sharp, square edges and which encircle the outside eye part. A $\frac{3}{4}$ -inch round pin with sharp edges and about 1 inch long is placed on top of the center of the eye. One light blow from the steam hammer cleans the fin from the inside and outside of the eye bolt which has taken but two heats to make.

Now some smiths may think that stock $\frac{5}{8}$ by 2 inches would be the right size to use, but such is not the case, as it would block up the tool and thus make it hard for the metal to free itself. In taking $\frac{1}{2}$ by 2 inches, the metal in the center has to lodge somewhere, and the only escape



A QUICK AND EASY METHOD OF MAKING EYE BOLTS UNDER THE STEAM HAMMER

"No, I haven't done anything about it except send for a catalogue or two and read what some of the machines will do," returned Mrs. Blake.

"Well, you know something about them then," agreed Foster. "Tom here has been building a few incubators for some of his friends round about and I think he has one back there in the wood shop now just waiting for the finishing touches. If you've got time suppose you look at it when he comes in. Maybe he can build you one just as you want

Tom entered into the demonstration of the incubator with new spirit and he really surprised Foster with his demonstrating and selling ability. In fact his demonstration of the incubator was so successful that Mrs. Blake insisted upon purchasing that particular incubator despite the fact that it was built to order for some one else.

"Not so bad for a morning's business," said Foster as Mrs. Blake's buggy drew out of sight down the road.

"I think it's pretty good," said



it has is to get into the groove which makes it $\frac{5}{8}$ of an inch thick.

If these tools are properly made the young apprentice can turn out as perfect an eye bolt as the skilled smith, because it is almost impossible to go wrong.

A Case of Deflation

GEORGE WILSON
(in *Machinery*)

It is an idiosyncrasy of human nature to derive considerable satisfaction from the discomfiture of a performer who is putting on frills in an effort to aggrandize himself in the eyes of the audience—in plain English, “playing to the grandstand.”

Bill and I were making the rounds of the machinery section of a State Fair. A crowd that was gathered around the exhibit of a carriage-maker drew our attention, and on edging our way to the front we found the attraction to be several blacksmiths at their forges producing the various iron parts that went into that particular make of buggy. The *piece de resistance* of the exhibit proved to be a young fellow of perhaps twenty-five years of age, and it was quite evident that if there was any applause lying around loose he meant to have it.

He was a typical melodramatic smith, tall, broad-shouldered and a “good looker” generally. His hair was carefully arranged; his blue flannel shirt was open at the throat, disclosing a section of manly chest, and his sleeves were rolled rather higher than was necessary to give play to biceps that knotted and swelled just a little more than the job warranted. His get-up was one of “studied indifference” as the novelists say. But his action! Chesterfield and the Apollo rolled into one had nothing on him. Grace incarnate. The poetry of motion. The methodical plodding of the veterans at the other anvils was only cheap newspaper prose compared to his easy grace.

“My, ain’t he grand!” breathed a callow damsel ecstatically through a mouthful of popcorn.

His pride was partly excusable, for he was really a good workman. With a few deft blows he would have a rod welded and bent into a graceful scroll. Then to prove the merit of the weld and the quality of the material he would bend and twist the cold piece over the anvil

One of the duties of the smiths was to pass out souvenirs in the form of pewter facsimiles of a medal the carriage concern had won at some exhibition. This the Apollo did with a fine condescension.

“That guy is all right, but he ought to take something for his head,” muttered Bill. Then to the Apollo, timidly, “Don’t you ever get a bum weld?”

If a look could have killed, Bill’s demise would have been swift and terrible. Chastened and contrite, Bill slunk back as Apollo flourished his irons from the fire and struck the uniting blow. Amazed he looked at the glowing ends. They had not stuck! Back to the fire. Another trial. Nothing doing. Some of the crowd tittered. The veterans at the other anvils grinned appreciatively and the Apollo’s face got red. There were no flourishes when he grabbed some new irons and brought them to a heat. Biff! Bang! Swat! The pieces stuck about as nicely as a couple of pieces of brass would have done.

Apollo ceased his effort and mopped his classic brow. The hauteur had all oozed out. The snickers became general and included a few uncomplimentary remarks.

“Let’s get out of here,” muttered Bill. As we turned to leave, the Apollo started to heave out his fire. Outside the crowd, Bill exploded, and a suspicion dawned in my mind.

“Bill,” I demanded, “what did you do to that fellow’s fire?”

“Nothing much,” grinned Bill, “just dropped a couple of his medals into it.”



Benton’s Recipes

Benton was quietly reading a copy of “Our Journal” and filling the “Forge Room” with wreaths of blue cigar smoke until the

atmosphere was almost choking. Finally, after a severe attack of coughing, the Editor exclaimed:

“Why don’t you get a down-draft attachment on that cigar of yours, Benton? That bundle of cabbage you’re trying to smoke is worse than an old-style forge without a chimney. Here, throw that out.” And the Editor handed Benton one of his favorites.

After lighting the new torch and giving it a few preliminary puffs Benton said thoughtfully: “I was just wondering, Mr. Editor, how long I would have to puff on that rag before you took the hint.”

Seeing he had been tricked the Editor said: “Oh, I’ll get back at you. I’ve got some real work for you; so get out your recipe book and get busy.” And picking up a letter from a pile on his desk the Editor continued. “First, I want you to tell me of some good preparation that can be applied to tools, guns, revolvers and such things to protect them from rust when placed in a storage or display case and which will also absorb any moisture that may be on the polished surfaces.”

“That sounds like a rather hard nut to crack, but I think I have some sort of oil mixture here that will do the trick.” And Benton thumbed the leaves of his book, carefully, looking over each page until he exclaimed: “Here it is—and it’s just the proper thing. Simple, easy to apply and cheap. Take equal parts of grain alcohol and the best grade of sperm oil and keep in a tightly corked bottle. When ready to use shake thoroughly, so as to mix the oil and alcohol which separate when standing for any time, and apply to parts desired. The alcohol will absorb any moisture on the surface to which the mixture is applied and shortly afterward evaporate, leaving a thin protective coat of sperm oil.”

“Well, that sounds good,” said the Editor as Benton finished reading. Then, continuing: “Here’s another question from a sheet metal worker. This man writes that he has a great deal of work to do on contract for a concrete worker. He says the concrete company have designed a lot of forms for steps, curbing, water troughs, and the like and they want the forms made of sheet iron braced with angle stock. What he wants to know is how to prepare or coat his sheet metal with some substance that will show his markings and cuttings lines as he lays out the work for his men.”

“I’ve got just the thing for that chap,” returned Benton, looking through a packet of papers which he had removed from his pocket. “I got a recipe from Sam Bullock over at the Johnson Works. Here it is now—I just jotted it down on a little slip, because I didn’t happen to have my notebook with me. Take whiting and white lead and mix with enough boiled linseed oil to make a thick paste. Add some Japan dryer and then thin with benzine or gasoline. This when dry will leave the surface of sheet metal, white; so that designs and cutting marks will show very distinctly when drawn on the whitened surface.” Then, continuing, Benton said: “I have also heard of whiting and gasoline being used for the same purpose. The gasoline evaporates, leaving the deposit of whiting on the metal. This, however, is not sufficiently permanent where the sheet metal is subjected to any great amount of handling.”

“That first recipe will no doubt just suit our friend,” agreed the Editor. “However, the second is a good recipe to know about when laying out small jobs that are cut immediately after laying out. The next question is easy. This man—”

But further discussion was interrupted by the appearance of the office boy with several bundles of proofs from the printery.



The Blind Man

W. O. B.

Th' other day I had a lesson
That did me a lot o' good.
I was sittin' in the mill yard,
Waitin' fur a load o' wood—
When a blind man came a-tappin'
'Long the path right down toward me.
Blind as stone he was, but singin'
Jes' es though his eyes could see.

As he kep' his cane a-tappin',
Keepin' time t' "Nellie Gray,"
Couldn't help but keep from wonderin'
What could make a blind man gay.
So I up and asks him—Says I:
"Why so cheery in your plight?
Surely things air purty cheerless
Even for us who have sight."

"May be so," the blind man answered,
"May be, too, it's well I'm blind.
For I see just pleasant faces—
Not with eyes, but with my mind.
When I picture all the faces
O' the folk with whom I meet
Thur ain't one but what is handsum,
Cheerful, pleasant an' jes' sweet."

Seems t' me thet cheery blind man
Kind o' hes the right idee.
Allus seein' jes the brite side
Sort o' makes appeal t' me.
How'd it be for us thet's sighted
Jes' to see the good an' clean,
Shut our eyes t' what is ugly,
Close our ears t' what is mean?



Yesterday is gone, today is going—hence,
keep a-going while the going's good.

How good would a man be if he were
as good as he believed others should be?

Profit is the distance between cost and
price. The shorter the distance the greater
the profit.

When the next chap comes in with his
family troubles "a-lookin' for sympathy,"
tell him to look in the dictionary.

Don't forget the B. L. Keep at it con-
tinually, everlastingly, persistently. Just
Boost! Boost! Boost! That's all.

When a debtor says: "I'll pay you to-
morrow"—just, remember, that tomorrow
is always coming and never arrives.

Appearances count big in business. See
that the appearance of your shop tends to
increase and not decrease your business.

Some folks get ready to start about
quitting time. Perhaps that's why they
never accomplish very much.

Which is worse—Mr. Would-be-Business
Smith—not to know or to guess and guess
wrong on the cost of doing business?

Half the failures during good business
periods occur because the bankrupts do not
know their costs—ask any referee in bank-
ruptcy.

Don't pursue your business on the theory
that: "If he can do it for that price, I can."
It's fatal—and you will know why when you
know your own costs.

"It's mighty hard to account for some
things," says Ol' Bill Bradley, "an' one o'
the things is sum o' the accounting y' find
in sum smith shops."

And you've heard lots o' stories about
big fish and big catches, but you haven't
heard anyone tell of getting one single
fish they didn't go after, did you? Think
it over.

"Begin with enough capital," says Thorn-
ton, "to carry you along until you have
turned your stock twice. Then you will
not need any more unless you make some
pretty costly mistakes."

When you really know what it costs you
to shoe a horse, to set an axle, to put on a
new tire or to replace a worn plowshare
then and not until then will you really
know just what profit you are making.

Cuff Brasher says: "If yer a failyur,
folks tell what a great chap y'd be if it
wasn't fer booze or jest downright laziness.
An' if yer a success, they say y've got a pull
or a cinch. Yer in bad either way, so take
yer pick."

This issue begins another new volume—
number thirteen. Unlucky, did you say?
Just watch—Look out for new stunts—
bigger features—better articles—new writ-
ers. Can't do it? Wait and see. Tell your
neighbor.

Ol' Bill Trainer sez: "Yes, thar's a
secret about successful trainin', whether
y'r trainin' hosses er men. An' thet secret
is simply a well trained voice. The teacher
er trainer who hasn't learned t' control his
voice will never control man er beast."

When it costs more to find out what a
job costs than it does to actually do the job,
it's time to call a halt. But don't go to the
other extreme. Strike a safe middle course—
a little cost accounting and a little common
sense make a combination that is hard to
beat.

Give your business liberal helpings of
advertising food and see it just bloom and
blossom with life. You can't expec a
business to grow and prosper unless you
feed it. Advertising food is the best busi-
ness builder ever known. Ask Heintz,
Ivory Soap and Kellogg.

It won't take long to write up that recent
hard job—that peculiar job—or that one
you did successfully under difficulties; and
the Editor and all of "Our Folks" will be
mightily interested in reading about it.
Let's do it now. You write it and send it
and we'll read it and publish it.

Get in touch with our Book Department
now. You'll want to make good use of the
coming winter's long evenings, and the
best and most profitable way is to read up
on those subjects upon which your knowl-
edge is "shaky." Tell us what you want
to know and we'll tell you how to get it.

Keep the bills young and you'll always
be able to handle them; and this is true of
bills payable as well as bills receivable.
When a bill is old it's pretty hard to get
the money whether you owe it to someone
else or someone owes you. Best never to
allow the bill to get old on your hands.

"You can't teach an old dog new tricks,"
said Tom Tardy when our subscription

solicitor asked for a trial subscription order.
Yet hundreds of "Our Folks" who have
been in the trade thirty, forty and fifty years
say: Never too old to learn." "Something
new every month." "Your paper shows
me that I don't know it all yet."

Some shops can do a strictly cash busi-
ness and some can't. If you must extend
credit do so by all means. But—do it in
a businesslike manner. There is no objec-
tion to a credit business except in the way
it is carried on. See that no one gets credit
who is not entitled to it; and see that your
credit customers live up to their promises.

"How much?" asked the deaf, penny-
pinching farmer, calling for a repaired wagon.
"Seven-fifty," replied the smith.

"Leven-fifty!" exclaimed the farmer,
"why, Jones would a' done thet little job
fer nine—I'll give y' ten dollars cash."

"I said seven-fifty," shouted the honest
smith.

"Oh! seven-fifty," repeated the farmer,
sharply. "Well, I'll give y' seven an' call
it square."

"It was a hot, sultry morning in August,"
relates Mr. I. J. Stites, "among the country
parson's auditors was the village smith who,
comfortably seated, soon succumbed to the
morning's drowsiness and finally fell into
his usual Sunday-morning nap. The par-
son had chosen his text from Job 5-7, and
as he warmed to his subject his voice rose
higher and louder in its discourse. Finally,
to emphasize one particularly strong point,
the parson fairly shrieked: "As the sparks
fly upward—" "Get a Buffalo down-draft
forge like mine," shouted back the village
smith, suddenly roused from his slumbers,
"then the sparks won't bother you."

"Thin, flat tools" says an English smith,
"are nearly sure to warp or twist when put
in the water to harden. I have done many
a job of this kind and have had no trouble.
My method, which I learned from an old
smith, is to heat the tool and when ready
to quench it place a piece of paper on the
surface of the water. Then take the tool,
hold it over the center of the paper and
push the paper down quickly into the water
with the tool and leave the tool until cold.
The tool may then be withdrawn, polished
on one side and reheated on a piece of flat
iron until the proper temper color appears."
If you have had trouble from warping when
hardening and tempering plane irons,
chisels and knife blades, try the above hint
and let us know how it works.

The hazel crotch as a water finder has
been endorsed by German scientists. A
congress of scientists which met at Halle,
Germany, recently placed on record the
opinion that it was a scientific fact that
the forked willow or hazel stick, or even
an iron or steel rod, in the hands of certain
persons, would indicate subterranean water
sources, and coal, potash and other mineral
beds.

The French Academy of Science dodged
the question the week previous, but the
German Congress at Halle decided that
in view of the mass of evidence secured
during the two days of successful practical
experiments in the vicinity of the place
where the meeting was held, and elsewhere
under conditions which precluded any fraud,
science could no longer deny the results
that have been achieved.

The first experiments were made near
Schoenbeck where a bed of rock salt and
two beds of potash were located by the
divining rod. Mineral charts afterwards
proved the correctness of the work of the
divining rod. At a point near Esleben a
subterranean stream was located by a rod.
Boring at the spot showed that the rod was
right.



Our Honor Roll

A New Name in Second Place

Mr. Stites has been "nosed out" of second place by Waddington Farm of West Virginia with a subscription account paid up to March, 1928. This puts Mr. Stites into third place, but Mr. Watt still holds his position as leader. Will anyone displace him?

Sixty-seven new names have been added to Our Honor Roll this month—were you one of the sixty-seven? Better get into line quickly—even the leaders are losing their places. If you're near the end of the list, get up in front. If you are not on at all, get into the list without delay. It means a big saving to you; and the sooner you save it the more you save.

U. S. and Mexico		Canada	Other Countries
2 yrs.....	\$1.60 save \$.40.....	\$2.00 save \$.50.....	10 sh. save 2 sh.
3 yrs.....	2.00 save 1.00.....	2.70 save 1.05.....	14 sh. save 4 sh.
4 yrs.....	2.50 save 1.50.....	3.20 save 1.80.....	18 sh. save 6 sh.
5 yrs.....	3.00 save 2.00.....	3.75 save 2.50.....	1 £ save 10 sh.
10 yrs.....	5.00 save 5.00.....	7.00 save 5.50.....	1 £ 14 sh. save 1 £ 6 sh.

Send your order and remittance now—today. Don't wait until you forget all about it. You'll never regret it. Our subscription insurance saves you money. The sooner you begin saving the more you save. There is no time better than NOW.

NAME

Subscription
Paid to

NAME

Subscription
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F. R. TOMLINSON, Kan.....	Nov., 1917	F. G. A. WILLIAMS, S. Aus.....	Jan., 1917
KAYE & AINLEY, Eng.....	Nov., 1917	E. E. TRINE, Pa.....	Dec., 1916
T. H. ZIEGLER, Wis.....	Nov., 1917	B. S. CASEY, Mass.....	Dec., 1916
SCHOLLER BROS., Ind.....	Nov., 1917	W. DENNER, Mo.....	Dec., 1916
E. M. WURSTER, Mich.....	Nov., 1917	J. B. SCHMIDLER, Ind.....	Dec., 1916
S. Z. FREY, Ind.....	Nov., 1917	F. KUMMER, Ohio.....	Dec., 1916
B. A. STEINER, Ohio.....	Nov., 1917	ALFRED CASE, N. Z.....	Dec., 1916
J. N. BATHGATE, N. Dak.....	Nov., 1917	H. GRIMM, Utah.....	Dec., 1916
W. H. HOUGHTON, Pa.....	Nov., 1917	A. H. GOODING, S. Aus.....	Dec., 1916
S. SMITH, S. Aus.....	Nov., 1917	LEONARD SMITH, N. J.....	Dec., 1916
W. STEPHEN, Queens.....	Oct., 1917	C. F. SHAW, Man.....	Dec., 1916
W. T. CUTCOMP, Iowa.....	Oct., 1917	W. ELWARD, Pa.....	Dec., 1916
J. DELAUE, Neb.....	Oct., 1917	W. W. EOLY, Pa.....	Dec., 1916
GEO. POTSCHEK, Mo.....	Oct., 1917	JOE BOYER, Mich.....	Dec., 1916
J. W. RAPP, N. Y.....	Oct., 1917	J. WILLIAMS, N. S. Wales.....	Dec., 1916
W. C. ROWE, Pa.....	Oct., 1917	J. H. W. SCHNEIDER, Cal.....	Dec., 1916
J. N. MILES, Ky.....	Oct., 1917	W. SAUER, Minn.....	Dec., 1916
EMIL PLATH, N. D.....	Sept., 1917	F. F. DARLING, Cal.....	Dec., 1916
F. STAU, Ohio.....	Sept., 1917	CHAS. NEWLAND, Cal.....	Dec., 1916
B. T. LARSON, Minn.....	Sept., 1917	J. T. BRAHM, Ia.....	Dec., 1916
H. SCHOONOVER, N. Y.....	Sept., 1917	P. H. ST. LOUIS, Wis.....	Dec., 1916
PERFECTION SPRING CO., O.....	Sept., 1917	A. E. NICKOLS, Okla.....	Dec., 1916
W. A. WILSON, N. Z.....	Sept., 1917	C. J. HALL, Wash.....	Dec., 1916
R. ROSS, N. S. Wales.....	Sept., 1917	BOB FRICK, Ala.....	Dec., 1916
I. E. SPROUD, Me.....	Sept., 1917	JORRIS BROS., Tex.....	Dec., 1916
FRED. BLOHM, Tex.....	Sept., 1917	R. CLEMENS, Conn.....	Dec., 1916
C. T. SWOOD, Kans.....	Aug., 1917	SCHREFFLEY & SCHMITT, Pa.....	Dec., 1916
GEO. B. HEATON, N. J.....	Aug., 1917	A. BRADSHAW, Ohio.....	Dec., 1916
CLARK & FAUPEY, Queens.....	Aug., 1917	J. E. BEATTY, Mo.....	Dec., 1916
C. L. HOCKETT, Cal.....	Aug., 1917	GEO. CAMERON, Scotland.....	Dec., 1916
H. C. STENHIL, Tex.....	Aug., 1917	JOHN KAHN, Ky.....	Dec., 1916
M. DJAGER, S. Africa.....	Aug., 1917	F. W. HOWELL, Ill.....	Dec., 1916
HOWARD, Kan.....	Aug., 1917	J. ROBERTSON & SON, Scot.....	Dec., 1916
H. FERRILL, Ill.....	Aug., 1917	W. M. GRIFFITHS, Aus.....	Nov., 1916
J. MCMEIKEN, N. Z.....	Aug., 1917	W. B. TAYLOR & SON, Mo.....	Nov., 1916
F. H. GIERKE, S. Aus.....	Aug., 1917	G. WHITTEN, Mass.....	Nov., 1916
A. L. PITTINGER, Ill.....	Aug., 1917	J. M. VINCENGA, Wis.....	Nov., 1916
J. P. KELLY, Md.....	July, 1917	TOM NOLAN, S. Aus.....	Nov., 1916
F. G. STONE, S. Africa.....	July, 1917	H. J. FRENCH, N. Z.....	Nov., 1916
H. J. DEVONSHIRE, N. Z.....	July, 1917	F. N. BROWNING & SON, Ky.....	Nov., 1916
V. J. HUBBARD, N. Y.....	July, 1917	J. MACUAB, Scotland.....	Nov., 1916
J. C. SKINNER, Vict.....	July, 1917	P. GRESSEN, Ill.....	Nov., 1916
H. A. CHEEVER, N. H.....	June, 1917	J. W. GRIMBLE, S. Aus.....	Nov., 1916
D. SHAPEL, N. Y.....	June, 1917	W. G. SIM, N. Z.....	Nov., 1916
W. R. GELLING, S. Africa.....	June, 1917	H. V. RUMEL, Ala.....	Nov., 1916
J. H. BAKERBERG, S. Africa.....	June, 1917	G. LINDBERG, Ind.....	Nov., 1916
A. R. HALLENBECK, N. Y.....	June, 1917	PITTMAN STELL, N. C.....	Nov., 1916
F. C. BOCK, Neb.....	June, 1917	J. S. FINKENBERG, Ind.....	Nov., 1916
P. VANDERBEEK, Mich.....	May, 1917	R. D. WILSON, N. Y.....	Nov., 1916
YOST & HALVORSON, Minn.....	May, 1917	J. MIKULIK, Tex.....	Oct., 1916
W. MCCOT, Kan.....	May, 1917	C. W. SCHMIDT, Cal.....	Oct., 1916
A. GUNTER, Tex.....	May, 1917	T. J. MAGUIRE, N. Y.....	Oct., 1916
C. F. J. LORENZ, N. Y.....	May, 1917	A. W. WATTS, Cal.....	Oct., 1916
A. DATWYLER, Ohio.....	May, 1917	C. W. ELLIS, Tex.....	Oct., 1916
E. T. HOOGMAN, Conn.....	Apr., 1917	J. P. SIMON, N. S. Wales.....	Oct., 1916
O. F. MATSON, Utah.....	Apr., 1917	E. A. KNAFF, N. Z.....	Oct., 1916
F. PETTIT, Okla.....	Apr., 1917	T. J. HASKING, N. S. W.....	Oct., 1916
H. G. MARKERT, Utah.....	Apr., 1917	LOTHIAN & SKINNER, N.S.W.....	Oct., 1916
E. THIBAUDAU, Wis.....	Apr., 1917	W. B. KNOUFF, Ala.....	Oct., 1916
W. PICKERING, S. Africa.....	Apr., 1917	GORHAM BROS., Ia.....	Oct., 1916
ED. BURROWS, England.....	Apr., 1917	W. H. F. BRANCH, N. C.....	Oct., 1916
L. KAUSCH, Wis.....	Apr., 1917	CLARK OLDS & CO., Neb.....	Oct., 1916
J. M. BROWN, Tex.....	Apr., 1917	IRWIN SCOTT, N. Y.....	Oct., 1916
W. WATSON, Vic.....	Mar., 1917	C. E. DURHAM, Kan.....	Oct., 1916
W. BAGLEY, Mass.....	Mar., 1917	M. RINGO, S. Africa.....	Oct., 1916
B. E. CAMPBELL, Mass.....	Mar., 1917	W. DELLEY, Queens, Aus.....	Oct., 1916
P. RUTTER, Ill.....	Mar., 1917	C. D. HUSS, Pa.....	Oct., 1916
G. STANKE, Wis.....	Mar., 1917	W. H. LEISTER, Ill.....	Sept., 1916
W. H. MILLER, Mo.....	Mar., 1917	W. E. STRANG, Ore.....	Sept., 1916
J. C. WOODS, W. Aus.....	Mar., 1917	E. F. HALLARON, R. I.....	Sept., 1916
C. BOULTON, N. S. Wales.....	Mar., 1917	A. F. BOND, Me.....	Sept., 1916
C. A. HAWKINS, Ore.....	Mar., 1917	C. T. HUMES, Del.....	Sept., 1916
A. L. MONTGOMERY, W. Va.....	Mar., 1917	J. ROPORD, Penn.....	Sept., 1916
J. PETERSON, Ia.....	Mar., 1917	E. P. GATES, Mass.....	Sept., 1916
J. ANDERSON, Tas.....	Mar., 1917	H. SCHNOKE, Penn.....	Sept., 1916
A. J. NEILL, Vi.....	Mar., 1917	C. H. MCCUTCHEON, Conn.....	Sept., 1916
ED. DETRICH, Ind.....	Mar., 1917	J. K. HAWN, N. J.....	Sept., 1916
LEWIS CHASE, N. Y.....	Mar., 1917	T. M. BLACKMAN, Pa.....	Sept., 1916
E. O. LEE, S. Dak.....	Mar., 1917	G. H. TORLINE, Kans.....	Sept., 1916
S. STEPHLE, Ohio.....	Mar., 1917	S. B. PHILLIPS, W. Va.....	Sept., 1916
R. S. GUGLBERG, Kan.....	Mar., 1917	G. E. HARPER, Texas.....	Sept., 1916
J. S. HASKELL, Col.....	Mar., 1917	J. J. ILLER, N. S. Wales.....	Sept., 1916
W. L. ROARK, Tex.....	Mar., 1917	JAMES PORTINGER & CO., Mo.....	Sept., 1916
A. R. BARLOW, Tex.....	Mar., 1917	JNO. GOETTINGER, Ia.....	Sept., 1916
C. A. WHITACRE, Ohio.....	Mar., 1917	GEO. FLECKENSTEIN, Cal.....	Sept., 1916
B. P. CARNY, Ill.....	Mar., 1917	GEO. HILL, Aus.....	Sept., 1916
T. J. DORNEY, Conn.....	Feb., 1917	E. C. BEARD, Aus.....	Sept., 1916
F. MARSH, Mich.....	Feb., 1917	J. K. GLINICKI, Mich.....	Sept., 1916
J. H. WHITE, N. H.....	Feb., 1917	OSCAR BURNER, Md.....	Sept., 1916
MCGOWAN BROS., N. Y.....	Feb., 1917	A. J. HAMMOND, Cal.....	Sept., 1916
W. H. SCHENNE, Neb.....	Feb., 1917	ROBERT MURRAY, Cal.....	Sept., 1916
A. J. H. WEGENER, S. Africa.....	Feb., 1917	D. E. WRIGHT, Pa.....	Sept., 1916
H. SCHNETTE, Ill.....	Feb., 1917	J. S. HASKELL, Col.....	Sept., 1916
E. DOUGHERMAN, Ohio.....	Feb., 1917	R. SOMMER, Aus.....	Sept., 1916
J. W. HAUGHT, Ill.....	Feb., 1917	HALTER & FLICK, Wyo.....	Aug., 1916
CHAS. F. GIBBS, N. Mex.....	Feb., 1917	R. L. GRIGSBY, Cal.....	Aug., 1916
M. E. GOLLER, Pa.....	Feb., 1917	A. E. PACKER, Ariz.....	Aug., 1916
J. POTTSOFF, Neb.....	Feb., 1917	W. K. LANGFORD, Penn.....	Aug., 1916
G. M. GARNETT, Mich.....	Feb., 1917	C. C. SCHNAKE, Ind.....	Aug., 1916
ERNEST FINLEY, Pa.....	Feb., 1917	C. C. TINKER, Ohio.....	Aug., 1916
A. TILLMAN, Cal.....	Feb., 1917	L. E. BONTON, N. Y.....	Aug., 1916
WALKER BROS., N. Z.....	Feb., 1917	J. JASKIEWICZ, N. Y.....	Aug., 1916
G. W. WHITTINGTON, W. Va.....	Feb., 1917	GEO. WATERFORD, Miss.....	Aug., 1916
J. H. HOYLE, S. Africa.....	Feb., 1917	C. H. MORGAN, Vt.....	Aug., 1916
IRVING BROS., N. Y.....	Feb., 1917	J. T. BLACK, Mo.....	Aug., 1916
F. ROSCHT, Pa.....	Feb., 1917	L. C. SCHNAKE, Ind.....	Aug., 1916
AUGUST MILLET, Ill.....	Feb., 1917	L. H. HANEY, Penn.....	Aug., 1916
C. P. ROBERTSON, S. Africa.....	Feb., 1917	JAS. YOUNG, Penn.....	Aug., 1916
O. DANNEMAN, Minn.....	Jan., 1917	R. R. COCHRANE, Mass.....	Aug., 1916
S. HETEM, S. Africa.....	Jan., 1917	C. H. WINSLOW, Cal.....	Aug., 1916
G. A. GURLEY, Ore.....	Jan., 1917	A. A. MCLEAN, Nev.....	Aug., 1916
F. K. WADE, Me.....	Jan., 1917	E. METZ, Wis.....	Aug., 1916
L. V. SENN, Neb.....	Jan., 1917	J. W. ATKINSON, England.....	Aug., 1916
S. H. AUSTIN, N. Y.....	Jan., 1917	J. P. SMINK, Penn.....	Aug., 1916
H. KAHN, Ia.....	Jan., 1917	A. C. HARPER, Mont.....	Aug., 1916
J. H. BERGEN, Kan.....	Jan., 1917	J. A. SEQUIN, Can.....	Aug., 1916

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W. C. WATT, Kan.....	Dec., 1930
WADDINGTON FARM, W. Va.....	Mar., 1928
I. J. STITES, N. J.....	Jan., 1928
J. BAILEY, Man.....	Dec., 1923
W. E. TURNER, Man.....	Oct., 1923
G. L. DEWITT, Mont.....	July, 1923
W. W. GREGG, Tex.....	July, 1923
O. C. YOUNG, Mich.....	June, 1923
OTTO SIFFEL, Penn.....	June, 1923
A. CHAPMAN, N. Y.....	June, 1923
C. BIRLEY, Md.....	June, 1923
F. H. SHUFF, Penn.....	June, 1923
J. C. STOVER, Penn.....	Apr., 1923
W. SCHOONOVER, Pa.....	Apr., 1923
LOWMEAD BROS., Mo.....	Mar., 1923
J. CARSWELL, Ark.....	Mar., 1923
G. E. GLASIER, Ohio.....	Mar., 1923
T. BRADLEY, N. S. Wales.....	Mar., 1923
I. T. NEEDHAM, Ill.....	Feb., 1923
G. C. DISINGER, Miss.....	Feb., 1923
J. HUGHES, Ohio.....	Feb., 1923
J. WEBER, Minn.....	Jan., 1923
Z. A. ENOS, Kan.....	Jan., 1923
W. G. WIRE, Cal.....	Jan., 1923
F. S. BISHOP, S. Africa.....	Jan., 1923
S. P. HARNEY, Mont.....	Dec., 1922
W. BRECKNER, Okla.....	Dec., 1922
J. PABIAN, Neb.....	Dec., 1922
P. FREDERICKSEN, Iowa.....	Nov., 1922
L. O. LUNDRA, Ill.....	Nov., 1922
W. LAWSON, N. Z.....	Nov., 1922
W. H. MILLER, Iowa.....	Oct., 1922
O. A. MARTIN, Idaho.....	Sept., 1922
A. O. MORTIMORE, Idaho.....	Sept., 1922
H. J. WYATT, Wash.....	Sept., 1922
J. N. SKOW, Ia.....	Sept., 1922
A. D. STANFORD, Wash.....	Sept., 1922
T. TARKLEWIS, Que.....	Sept., 1922
A. PERRYER, Ohio.....	Aug., 1922
W. D. VALENTINE, Iowa.....	Aug., 1922
G. HOFFMAN, N. Y.....	July, 1922
J. ERMAN, Ark.....	July, 1922
W. K. W. HANSEN, Pa.....	June, 1922
ROBERT TOCHTER, Cal.....	June, 1922
J. VAN MARTER, N. Y.....	June, 1922
E. ANDERS & SON, S. Aus.....	May, 1922
LOUISA CARRIAGE WKS., Va.....	May, 1922
S. SMITH, Tex.....	Apr., 1922
J. W. HAAR, La.....	Mar., 1922
E. A. DILLON, Nev.....	Mar., 1922
D. W. SMITH, R. I.....	Mar., 1922
D. F. KUTTER, Wash.....	Mar., 1922
G. F. JOHNSON, Mich.....	Feb., 1922
H. H. KEITH, Ia.....	Jan., 1922
O. M. JOHNSON, Minn.....	Oct., 1921
H. FELDUS, Neb.....	Sept., 1921
W. K. KLINE, Kan.....	May, 1921
J. L. JESTER, Mo.....	Jan., 1921
R. S. CRISLER, Ky.....	Jan., 1920
ED. GRIMM, Tex.....	Mar., 1920
T. P. CONSIDINE, Mass.....	Dec., 1920
J. NAISMITH, N. Zealand.....	Nov., 1919
F. UNDERWOOD, S. Africa.....	Aug., 1919
THEO. PASCHKE, Neb.....	Apr., 1919
I. M. TOWNSEND, Cal.....	Apr., 1919
G. BISE, Fiji Islands.....	Apr., 1919
C. WILLIAMS, W. Aus.....	Mar., 1919
R. TAYLOR, N. Z.....	Feb., 1919
C. WALTER, Ore.....	Sept., 1918
T. B. HOLT, Okla.....	Sept., 1918
ROBERT COOK, Ky.....	Sept., 1918
A. B. WENDLANDT, Wash.....	Sept., 1918
A. J. BROOKMAN & CO., Vic.....	Sept., 1918
PETER COCKS, W. Aus.....	Sept., 1918
R. J. TOMPKINS, Tex.....	Sept., 1918
L. SMITH, Cal.....	Aug., 1918

NAME	Subscription Paid to
GEO. REID, S. Africa.....	Aug., 1918
H. KELENBENZ, N. J.....	Aug., 1918
W. D. BRADFORD, Cal.....	Aug., 1918
A. DISCHER, Aus.....	Aug., 1918
GILBERT BROS., S. Aus.....	July, 1918
A. MACKENZIE, W. Aus.....	July, 1918
GEO. DASH, N. Zealand.....	July, 1918
C. R. OLIVER, S. Africa.....	July, 1918
L. G. REID, S. Africa.....	July, 1918
W. M. PURTEAR, Ala.....	June, 1918
THOM & VERSTER, S. Africa.....	June, 1918
L. LACASTE, Que.....	June, 1918
WRIGHT & SON, Tex.....	June, 1918
ALBERT MILLUM, N. D.....	June, 1918
J. LINDSAT, S. Af.....	June, 1918
J. H. GIBBS, S. Af.....	June, 1918
W. W. BRIDGES, Ark.....	June, 1918
ED. HOLLAND, Queens.....	May, 1918
H. L. HASWELL, N. C.....	May, 1918
J. H. MARTIN MFG. CO., Ind.....	Apr., 1918
H. S. WAYNE, S. Aus.....	Apr., 1918
H. S. YOUNG, Wash.....	Apr., 1918
W. WELLSHAUSEN, N. D.....	Apr., 1918
W. H. CHIPMAN, Mo.....	Apr., 1918
A. P. STROBEL, N. Y.....	Apr., 1918
E. H. ALBERTY, Penn.....	Apr., 1918
J. R. JEFFRIES, Pa.....	Apr., 1918
E. COLVIN, Ind.....	Apr., 1918
J. B. JEFFRIES, Pa.....	Apr., 1918
J. LIPPERT, Ill.....	Apr., 1918
OTTO TITZ, S. Africa.....	Apr., 1918
J. V. FISH, Ill.....	Mar., 1918
H. J. FISHER, Mich.....	Mar., 1918
GEO. SMITH, N. Z.....	Mar., 1918
AUG. HOLANAGEL, Ore.....	Mar., 1918
A. E. UHRLING, Wis.....	Mar., 1918
P. J. THORNTON, N.W.T.....	Mar., 1918
J. C. YOUNG, Pa.....	Mar., 1918
D. C. HOUCK, Ohio.....	Mar., 1918
J. MOLITOR, Ill.....	Feb., 1918
F. P. FELLOW, N. Y.....	Feb., 1918
J. W. STEADMAN, Ohio.....	Feb., 1918
J. P. HOLSAFFEL, Penn.....	Feb., 1918
E. N. GATES, Vr.....	Feb., 1918
RENTON WAGON WKS., Wash.....	Feb., 1918
WHITING Fdy. Equip. Co. Ill.....	Feb., 1918
J. P. KOENIGS, S. Dak.....	Feb., 1918
RICHARD BRENNER, Tex.....	Feb., 1918
W. F. HILL, N. C.....	Feb., 1918
J. B. BETTEL, Me.....	Jan., 1918
W. MISCABLE, Queens, Aus.....	Jan., 1918
S. PORTELANCE, Que.....	Jan., 1918
D. C. FOLEY, Cal.....	Jan., 1918
GLEASON BROS., La.....	Jan., 1918
C. E. KRUG, Wis.....	Jan., 1918
G. E. WOODARD, Kan.....	Jan., 1918
P. J. DALLY, W. Aus.....	Jan., 1918
J. MORROW, Pa.....	Jan., 1918
F. PROCTER, Tas.....	Dec., 1917
J. G. JOHNSON, Ill.....	Dec., 1917
F. E. EGLERS, Ohio.....	Dec., 1917
C. T. FORREST, Cal.....	Dec., 1917
THEO. BUSH, N. Y.....	Dec., 1917
J. T. ELLIOTT, Ill.....	Dec., 1917
J. VOELPEL, Ill.....	Dec., 1917
W. J. MAIN, Cal.....	Dec., 1917
G. J. SAUER, Mo.....	Dec., 1917
MESS BROS., Vict.....	Dec., 1917
E. BLOOMER, Aus.....	Dec., 1917
H. P. ADAMSON, N. Zealand.....	Dec., 1917
McMILLAN, HEAD & CO., S. Africa.....	Nov., 1917
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Fifty-Seven Reasons Why You Should Fletcherize Your Trade Journal

Plain Pickled Pointers

ELBERT HUBBARD

The successful man is the observant man.

He is the man who possesses the fine art of eliminating the superstitious, the unauthoritative and the worthless.

The successful man maintains a checking account in his own psychic first-national in his roof-garden.

With the unfailing constancy of a perpetual motion machine he deposits New Things there, on interest. And he is no glutton, either. He loves not the golden doubloon of knowledge for its own sweet self alone. He loves it because he is in the game. He is the modern business man or craftsman. He is ever circulating his fund. He applies it as it applies to his calling.

Now—what is observation?

Observation is merely the ability to utilize your divine lamps to good advantage. First you must see, then you feel, then you know. Informed men are those who can work intelligently. And it makes little difference how many eyes you've got, either. A certain railroad genius can see more with one eye than most folks can with two.

If you've only a thirst for knowledge you can satisfy it by imbibing the spirit of progress.

We grow as we do. We become by doing things—not folks.

The wrong way now may have been the right way in the—infinite past.

And so we grow. If you are aware of anything worse here upon this blessed globe than a retrogressive, ~~what was good for Da-da-is-ditto-for me~~, kindly step up on the platform and whisper it in my ear.

He is the kind who does not read the journal in his own field. He synchronizes past and present. And his desert is what he deserves—oblivion.

We must give and sweat, in order to live and get! Reciprocity! We receive commensurably with what we give. But you must have something to give. Mere willingness and right intent is not enough. You are being paid not only for what you can do but for what you *actually* do—for results.

If one is ever going to amount to anything in his own line he must be able to do a thing better than the other fellow. Otherwise, obsolescence for his—down in the mire with the rest of the groundlings.

To give or not to give—to be or not to be—aye, that is the question! If you agree accordingly, our panacea of: Be Up to Date! Know! Know! Know!—becomes operative, practical.

The man who knows is the man who goes—up in the world of dollars and sense—in the estimation of others and in his own!

He reads his Specialized Journal.

Trade Journals are the Heralds of industry and prosperity. They are the radicals in the convention of progress. They are experimenters, builders, systematizers, organizers, pioneers, in their own particular field.

They are the consecrators and conservators. They are the cats that pull the chestnuts out of the fire—for our delectation.

They are the Courts of Last Conjecture. They know! It is their business to know—that is why they exist. And we learn all we know from them. For Trade Journals are nothing but crystallized fact—pre-digested Food of Experience. You may apply the sauce of disbelief ad-liberatum. And Experience is the Universal Educator.

Trade, Class and Technical Journals make it a business to tell the Truth. They do not deal in hearsay, rumor, misinformation or hypocrisy. Life is too short and they know it. They taboo the nebulous. They omit the intangible. They venture to verify, and verily—they do.

They give a man courage, animation, ambition. They are not published for mummies. If you would savvy of the new wrinkles in your business or profession; if you would know how other folks are progressing, thinking, what methods they employ to achieve their ends—and how to improve your condition and position—if you would converse with the men who are headliners in your field, who have already made good, but who are still discontented, still striving, hoping, aspiring to greater things, and who have worked out their own salvation—if you would continue to be such a man yourself—read your Specialized Journal!

The man who refuses to get out of his shell is a Lobster! And who wants to be a Lobster? I almost hear you saying to the man behind the procession: "Quit hibernating! That reclusive stuff don't go."

Get out and meet the world. Absorb animation, amity, animal-heat, love of work, charitableness, vim, vigor and vitality. Resolve to do, or die doing. Absorb, like a lusty bull calf, from that big, blessed, beneficent enterprise—The Trade Journal.

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The Effect of Heat Treatment on the Efficiency of Welds*

JOHN JERNBERG

In carrying out this work the processes used in welding were hand and electric.

In the hand welds two different sets of welds were obtained, one set being made by an experienced blacksmith while the other set was made by a student. The experienced blacksmith was given his choice of welding compound or borax as a

*References: An extensive search was made to see if any results or any work along this line had been done before starting this experiment work, but up to date nothing along this line of heat treatment had been done, especially on welds. So with this understanding in mind it is to be considered that this work is entirely of an original investigation.



flux in producing the welds. His choice led to the Anti-Borax Welding Compound, while the student's choice was that of the plain crude borax in the powdered form.

In the electric welds, however, no flux was used, because here the intense heat produced allows no air to enter between the two pieces to be welded.

The material used was the ordinary low-grade tool steel as bought in the open market, the percentage carbon asked for being .60 points, while that received and analyzed being very close to this figure, as seen in the tabulated sheet for the carbon analyzation. The material came in $\frac{1}{8}$ -inch round bars, from 15 to 18 feet in length.

These bars, for the hand welds, were sawed up into 12-inch lengths, while for the electric welds the length was made just half, or 6 inches in all.

These pieces were all numbered in double numbers; the pieces being stamped with a letter of the alphabet for each bar and then

with a numeral thereafter for those to be given the different heat treatments; thus every different heat-treated bar had a different numeral stamped on it.

Three welded specimens together with one bar stock specimen were considered a set for each different heat treatment.

The heat treatment for these test pieces consisted in four chief processes, namely: annealing; annealing and restoring; annealing, restoring and hardening; and annealing, restoring, hardening and tempering. Each heat treatment being given to a set of welds from the same bar stock as explained above.

One piece of the bar stock was taken and tested for the properties as tabu-

lated in the following tabulation sheets; this being done so as to obtain an efficiency of what is called the bar efficiency; that is, the efficiency as obtained from the comparison of the tested specimens with this sample bar stock; the figures used being the ultimate strength of the stock and specimens in each case.

Hand Welding

Four different sets of hand welds were made by each welder; the four sets combined with all the different heat treatments being combined in one big set. The preparation of the hand welds for both the welding compound and the borax were exactly alike; the method being as follows: the pieces to be welded were placed in the fire, and when a working heat was obtained they were withdrawn and pointed, thus forming laps, the length of the point being equal to

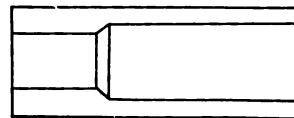


FIG. 3—ONE HALF OF SLEEVE USED

pieces and also providing for the heat to begin in the middle of the stock and work outwards; thus giving more of a chance of an even heat throughout the stock. If the pieces are placed in the machine with just the straight square ends, then when the current is turned on the heat is bound to begin on outer edge instead of in the middle, since exact alignment is hardly possible. When the pieces had reached a welding heat they were forced together by means of a lever arm; the amount of forcing being enough to jam the two pieces together thoroughly, even though it forms an upset

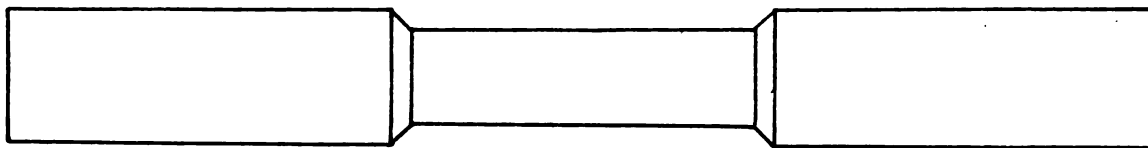


FIG. 2—SHOWING FULL SIZED TEST SPECIMEN USED TO DETERMINE TEMPER

about the diameter of the stock. Thus when the laps were all pointed for one weld the two pieces were then placed in the fire again and the weld was then made in the ordinary manner.

Electric Welding

The work in electric welding was done at the Crompton & Knowles Loom Works, Worcester, Mass., and was of the butt variety. (See Fig. 1.) The test pieces were turned to a sort of a bevel on one end, as shown in engraving, thus allowing only the center to come in contact when placed in the electric welding machine. When the jaws had been clamped down, the current was then turned on through the jaws which acted as the terminals; thus furnishing heat to the test

to the stock, since the weld is to be turned down for testing.

Preparation for Tests

The next step to do was to get the test pieces ready for the testing. First, they were straightened, then centered and a section about 4 inches long in the middle was turned down to a trifle larger than .700 inches. The two resulting ends were also rounded or turned, because when welded the specimens obtained rather peculiar shapes, and if these shapes were allowed to remain trouble would be experienced while testing, because a bending moment would then enter together with the regular tension which was the only thing desired. Therefore, to eliminate the bending moment, the whole of the test specimens were finished roughly or turned up all over.

When these were turned up the welds and specimens were taken into the forge room and given the heat treatment as explained above. When the proper heat treatment had been finished the specimens were then ground down to a diameter of .700 inches. This finished, the test pieces were ready for testing.

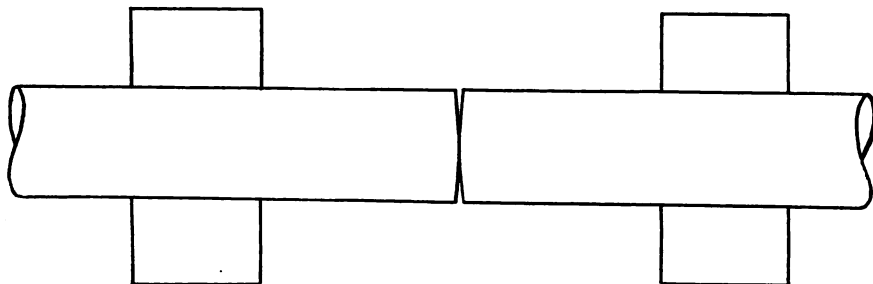


FIG. 1—DIAGRAM SHOWING HOW THE ELECTRIC WELD IS MADE

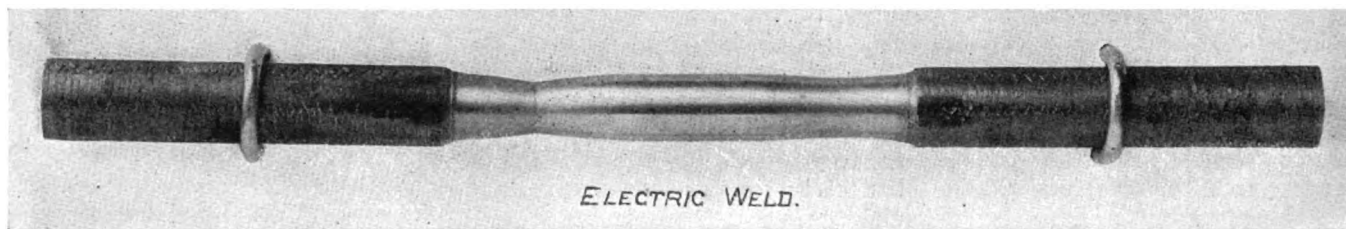


FIG. 4—SHOWING ELECTRICALLY WELDED SPECIMEN AFTER TESTING IN MACHINE

Before going on to describe the testing a brief explanation may be here given as to how and just what temper was given the tempered welds. This was done by making small test pieces, as shown in Fig. 2, showing the full size of the test specimen. Six of these specimens were made and hardened to the proper hardening point; then all were placed in the oil tempering bath with wires attached to each so as to enable one to be pulled out at the right temperature. In this way all the six temper colors were given to the test pieces; the tempering heats being obtained by means of a thermometer.

The specimen which gave the

highest ultimate strength was the tempering temperature to use for the welded specimens.

Results of Temper Test

Color	Degrees Temper.	No. Sq. In.	Ultimate Strength
Light Straw	430° F.		105,000
Dark Straw	460° F.		112,600
Copper	500° F.		122,000
Purple	540° F.		121,300
Dark Blue	560° F.		128,200
Light Blue	610° F.		123,500

Therefore, the temper to use for tempering the welded specimens was the highest ultimate strength, or the dark blue temper of 560° F.

Testing

When testing these temper specimens, trouble was experienced in

trying to hold the pieces in the jaws of the testing machine. The trouble found was that the jaws would slip or, in other words, would not bite. Since the temper specimens were already made and tempered and ready to be pulled apart it was found necessary to make some sleeves to hold these tempered specimens, so as to be able to pull them apart. These sleeves were decided upon, because if the test pieces were softened just the least trifle on the ends it might spoil the temper. Thus, sleeves to fit these pieces were then made; the sleeves being made in halves, one half of which is shown in Fig. 3.

These sleeves were found to turn

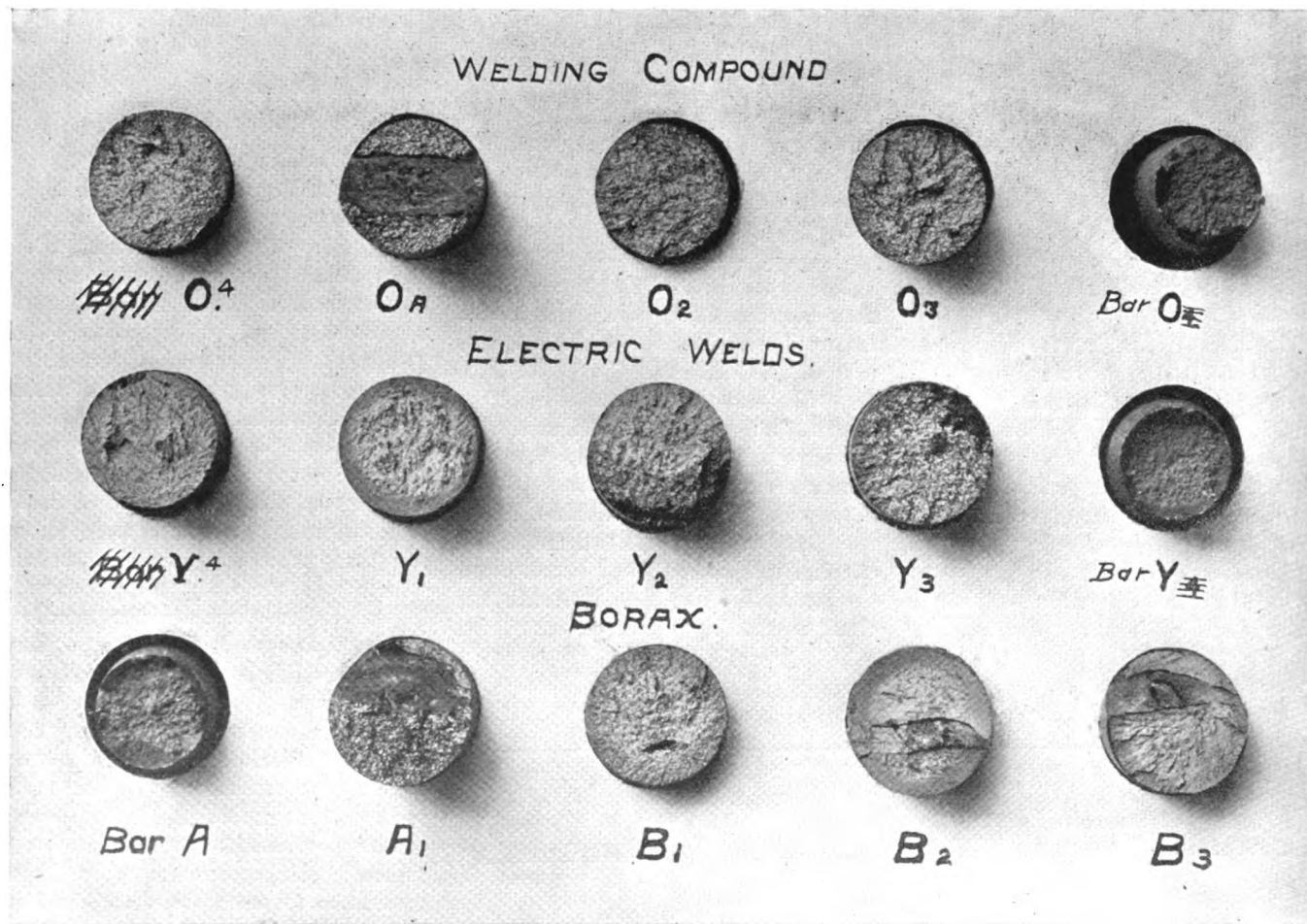


FIG. 5—SHOWING SAMPLE SET OF FRACTURES OBTAINED BY BREAKING PIECES IN TESTING MACHINE

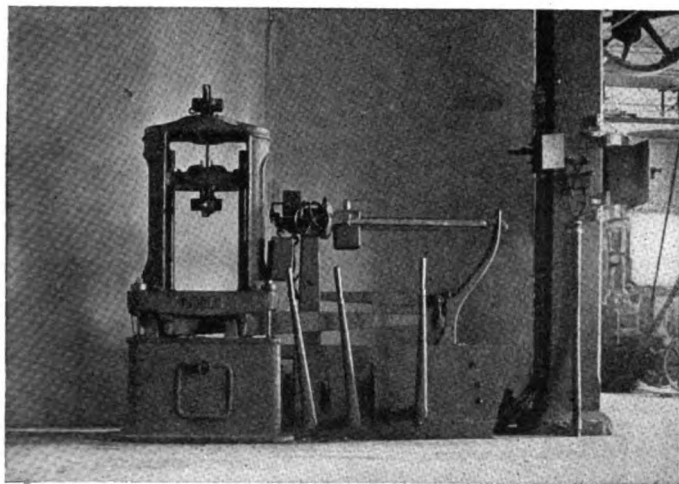


FIG. 6—THIS IS A RIEHLE TESTING MACHINE—
THE ONE USED IN THESE TESTS

the trick, and entire satisfaction was experienced with them. Before the regular welded test specimens were hardened, however, this difficulty of holding them in the testing machine was overcome by the use of the threading tool in the lathe; the threads made being done by hand just enough to rough up the ends so as to enable the jaws to sink their teeth into the ends of the specimens when being pulled apart. This method was also found to work out satisfactorily.

In Fig. 4 is shown an engraving from a photograph of an electric weld. This photograph is mainly intended to show the effect of the electric current on the steel just at the place where the weld had taken place. As seen in the picture it will be noticed that the middle part of the bar, or just where the electric current entered the stock, that the stock here was a trifle harder than the adjoining stock where the metal flowed when the specimen was pulled apart in the testing machine. Thus the diameter did not decrease in the middle at all while it decreased to an appreciable extent at either side of the weld when it finally broke in one of the narrowed sections.

This is the effect that the electric current has on the annealed welds or as they came from the electric welder; showing without question that an electric current does affect steel to an appreciable extent when heated high enough.

With the heat-treated specimens, however, this effect is not noticed, as the stock then is just as good as the original, if not even better.

In Fig. 5 is shown a picture of a sample set of fractures followed by a brief description. These specimens were picked out to show the fractures that were obtained from the various heat treatments; thus showing the effect of the grain under the different heat treatments.

Most of these specimens to-

gether with the other welds did not break in the weld, but rather clean across the grain, thus showing that the weld held more than the stock. This is mainly noticed in all the welds

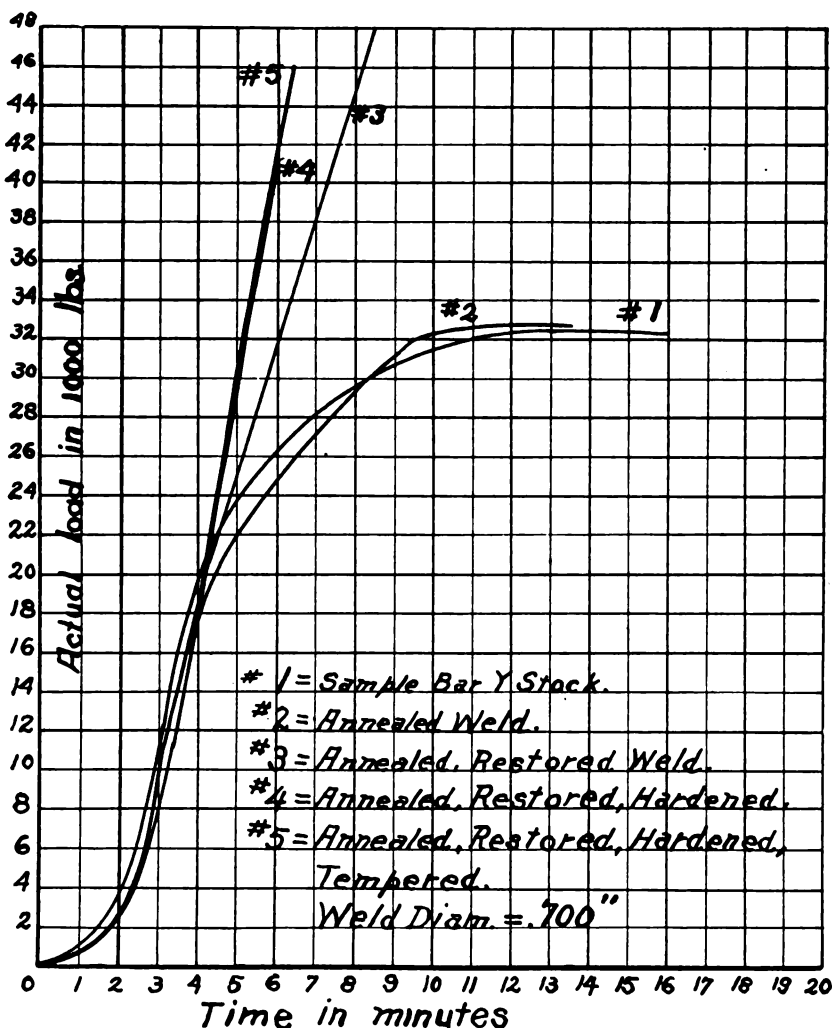
that were given the heat treatment as compared with the annealed welds; since these latter ones were the welds that mainly pulled apart in the weld.

Notation on Simple Fractures

In the photograph of the sample set of fractures, care must be taken to notice that the order of arrangement of the first and fifth bars in the first two rows, the Welding Compound and the Electric Welds, are the reverse of those in the row of borax welds. This reversing was due to the misplacement of the fractures while photographing same. This notation can very easily be carried in mind when looking at the fractures, since it is seen that the smallest diameters are the bar stocks.

Welding Compound Welds

Bar-O. Pulled apart like gum, giving a very dark gray grain, somewhat fibrous.



LOAD-TIME CURVES SHOWING THE EFFECT OF HEAT TREATMENT
ON ELECTRIC WELDS

These curves are drawn for the electric welds because these welds are of uniform strength and are thus shown to be more nearly alike. These curves are for the actual load pull for the weld diameter of .700 inches, and are not reduced to unit load.

JERNBERG WELDS
Using Anti-Borax Compound as a Flux
Sample A-Bar Stock

Bar No.	Yield Sq. In.	Ultimate Sq. In.	Elongation %	% Reduction Area	Bar Eff.	True Eff.	Remarks
A	52,900	87,400	21.3	38.4	100.		D. G. F.
Annealed Bar Stock and Welds							
A		100,000				100.	
A-0	46,500	91,100	9.38	7.42	104.3	91.1	I. W.
A-0	0	91,000	4.48	4.53	104.2	91.0	I. W.
A-0	0	78,200	2.82	3.51	89.4	78.2	P. W.
Average Efficiency					99.3	86.8	
Sample O-Bar Stock							
O	53,100	86,000	2.12	3.84	100.0	62.5	D. G. F.
Annealed, Restored, Bar Stock and Welds							
O	0	137,500	0.	1.42	160.0	100.	A. W.—C.
O-2	0	129,000	2.38	1.80	150.0	93.8	A. W.—C.
O-2	0	134,000	1.54	2.27	156.0	97.5	A. W.—C.
Q-2	0	122,000	1.45	0.	142.0	88.8	A. W.—C.
Average Efficiency					149.4	93.4	
Annealed, Restored, Hardened, Bar Stock and Welds							
O	0	111,300	0.	0.	130.0	100.	B. S.—F. C.
O-3	0	105,800	1.54	0.	95.0	95.0	A. W.—F. C.
O-3	0	106,000	5.08	0.58	123.0	95.1	O. W.—F. C.
O-3	0	82,500	2.94	0.94	96.0	74.2	I. W.—F. C.
Average Efficiency					104.7	88.1	
Annealed, Restored, Hardened, Tempered, Bar Stock and Welds							
O	0	126,000	0.	0.	147.0	100.0	B. S.—F. C.
O-4	0	124,000	1.49	4.2	144.4	98.3	B. S.—F. C.
O-4	0	122,000	3.03	0.82	143.0	96.8	O. W.—F. C.
O-4	0	126,500	3.34	1.15	147.0	100.2	A. W.—F. C.
Average Efficiency					144.8	98.4	

TABLE SHOWING RESULTS IN TESTING THE JERNBERG WELDS
AFTER VARIOUS TREATMENTS

Key to Remarks on Fractures	
A. W.	= Broke across weld
B. S.	= Broke in shoulder
C.	= Crystalline fracture
C. C.	= Coarse crystalline fracture
C. H.	= Has appearance as tho' case-hardened
C. R.	= Crystalline and raggy fracture
D. G. F.	= Dark gray fiber
F. C.	= Fine grain (crystalline)
F. G.	= Fine grain
F. Sy. G.	= Fine silky grain
I. W.	= Specimen broke in weld
O. W.	= Specimen broke outside weld
P. S.	= Partly stuck
P. W.	= Broke partly in weld
S. E. W.	= Stretched on either side of weld
Sy. F.	= Silky fracture

O-A. Pulled apart in weld, only the laps holding, thus giving a fine crystalline grain.

O-2. Broke across weld, showing that the weld was perfect and not noticeable, the grain being of a coarse crystalline nature.

O-3. Broke outside weld, giving fine crystalline grain.

O-4. Broke right across weld, showing no trace of any weld having been performed. Fine crystalline fiber-like grain.

ELECTRIC WELDS
Sample Y-Bar Stock

Bar No.	Yield Sq. In.	Ultimate Sq. In.	Elongation %	% Reduction Area	Bar Eff.	True Eff.	Remarks
Y	51,700	84,400	20.6	38.6	100.0	101.3	D. G. F.
Annealed Bar Stock and Welds							
Y	51,250	83,300	18.75	25.5	98.8	100.0	D. G. F.
Y-1	52,000	85,100	12.95	38.1	100.9	102.2	O. W.—C.
Y-1	52,300	84,750	6.25	12.6	100.4	102.5	O. W.—C.
Y-1	0	85,300	16.95	42.3	101.1	102.5	S. E. W.—O. W.
Average Efficiency					100.8	102.4	
Annealed, Restored, Bar Stock and Welds							
Y	0	135,200	1.59	1.9	160.4	100.0	C. R.
Y-2	0	128,800	2.31	2.13	152.5	95.1	C. R.—F. G.
Y-2	0	104,500	0.00	1.36	124.0	77.3	C. R.—F. G.
Y-2	0	123,300	3.03	2.48	146.1	91.2	C. R.—F. G.
Average Efficiency					140.9	87.9	
Annealed, Restored, Hardened, Bar Stock and Welds							
Y	0	130,800	0.	0.82	155.0	100.0	C. R.—F. G.
Y-3	0	125,000	0.	0.82	148.0	95.5	O. W.—B. S.
Y-3	0	113,500	0.	1.08	136.5	86.8	C. R.
Y-3	0	122,000	0.	1.38	144.5	93.3	Sy. F.—C. H.
Average Efficiency					143.0	91.7	
Annealed, Restored, Hardened, Tempered, Bar Stock and Welds							
Y	0	143,600	0.	0.	170.0	100.0	B. S.—C. H.
Y-4	0	132,500	0.	0.	157.0	92.3	B. S.—C. H.
Y-4	0	127,200	0.	0.	150.8	88.6	B. S.—C. C.
Y-4	0	136,500	0.	0.	161.5	95.0	O. W.—C. R.—Sy. F.
Average Efficiency					156.5	92.0	

SHOWING RESULTS IN THE TESTING OF THE ELECTRIC WELDS
AFTER HEAT TREATMENTS

Electric Welds

Bar-Y. Pulled apart like gum, giving a very dark gray grain, somewhat fibrous, showing the 45° break all around edge.

Y-1. Stretched on either side of weld, pulling down like straight stock and getting very narrow on either side of weld. Weld in middle did not narrow down any. The break finally occurred in one of the narrow sections, giving a very dark gray grain, somewhat fibrous. Thus electric welding toughened and made structure of steel a trifle stronger than rest of stock.

Y-2. Broke in middle where weld was, but across grain, showing perfect weld with fine grain raggy break.

Y-3. Broke in middle with no sign of weld. Very fine, silky, slate-like grain on edges and somewhat crystalline raggy in center, giving a strong resemblance to case-hardened steel.

Y-4. Broke on one side of middle with a raggy, fine, silk-like grain.

Borax Welds

A. Fine, very dark gray grain, showing pulled apart.

A-1. One half pulled apart in weld, the other half broke across grain in middle of lap. Coarse crystalline fracture.

B-1. Did not break in weld, but broke across whole section at a distance of ¼ from end of lap, giving a fine, fiber-like crystalline fracture.

B-2. Broke across 1st, 3rd, 4th quarter of stock, and pulled apart in weld in 2nd quarter. 3rd and 4th quarters were about ¼ inch shorter than 1st quarter, giving a very fine, fibrous grain, showing right hardening temperature was reached, thus giving a very fine, slate-like grain.

This shows that the steel can be restored to its original texture after welding has been performed; this weld being a borax weld.

B-3. 2nd quarter pulled apart in weld, rest held fine, giving a very fine, silky fracture. First quarter was ⅜ inch longer than 3rd and 4th quarters.

Referring to the preceding photograph it is seen that the grain for the annealed welds is rather coarse; that for the first treated weld is somewhat finer; while the third and fourth treated welds show a finer and finer grain in proportion to the amount of heat treatment.

**Carbon Analysis of the Bar Stocks**

Bar Stock A = .68 Carbon.
 Bar Stock B = .69 Carbon.
 Bar Stock O = .69 Carbon.
 Bar Stock Y = .65 Carbon.

Notation for Weld Tabulation

In the following tabulated results of the various welds the specimens marked with the single letter of the alphabet, as A, B, O, Y, without any number following, such as A-1, etc., are the bar stock for the various heat treatments and are thus distinguished from the welds, the latter being marked with some numeral following the letter, such as Y-2, Y-3, etc.

With this understanding it is clearly seen that the first line of tabulation under the various names of the heat treatments show the

"True Efficiency," is the real efficiency between the welds and the specimens. This efficiency is obtained from the comparison between the ultimate strength of the welds and the ultimate strength of the bar stock similarly treated.

Under "Remarks" the key to these letters is given. The idea of this is to give in a brief way the chief characteristics of the break on fracture of the specimen, thus eliminating the long and tiresome description of the various welds.

Cost of Electric Weld

Average time for setting in stock, welding and taking out = 52 sec.
 Average time while electric current is on = 35 sec.
 $35 \div 3600 = .00972$ hours.
 Electric welding machine is rated at 220 volts and 70 amperes.

$.2 \times (\$2.50 \div 10) = \$.050$ cost of one hand weld.

Cost of one electric weld = \$.0186
 Cost of one hand weld = .050

Thus from the above comparison it is seen that the cost of the hand weld is about 2.69 times that of the electric weld. Electric welding is by far the cheaper, quicker, easier, and together with all other things taken into consideration it is the best method of welding; providing the operator understands the principle of welding, thoroughly. If, however, the operator does not understand the principle of welding, thoroughly, then the electric welding is bound to give poor results, and in such a case it may, perhaps, be more economical to have the hand welds.

When it is desired to obtain a number of welds for test purposes, then it is best to provide the electric welds, since with a good operator one can depend on getting uniform welds, that is, welds that would stand about the same amount of pull.

General Conclusion

The problem of these experiments was to determine the effect of heat

STUDENT'S WELDS
 Using Clean, Crude Borax in Powdered Form
 Sample A-Bar Stock

Bar No.	Yield Sq. In.	Ultimate Sq. In.	Elongation %	% Reduction Area	Bar Eff.	True Eff.	Remarks
A	52,900	87,400	21.3	38.4	100.0	87.4	D. G. F.
Annealed Bar Stock and Welds							
A		100,000			114.4	100.0	
A-1	0	95,200	3.71	4.24	109.0	95.2	P. W.—C. C.
A-1	0	70,700	2.86	1.26	81.0	70.7	P. S.
A-1	0	80,200	2.32	2.77	91.8	80.2	A. W.—C. C.
Average Efficiency					93.9	82.0	
Sample B-Bar Stock							
B	52,400	84,000	25.00	43.75	100.0	256.	D. G. F.
Annealed, Restored, Bar Stock and Welds							
B-1	0	33,300	0.	0.	149.0	100.0	C. R.
B-1	0	97,500	0.	0.	116.0	292.0	O. W.—F. C.
B-1	0	125,900	0.	0.	149.8	376.	A. W.—F. G.
B-1	0	74,000	0.	0.	88.2	221.	P. W.—F. G.
Average Efficiency					118.0	296.3	
Annealed, Restored, Hardened, Bar Stock and Welds							
B-2	0	108,700	0.	0.	129.5	100.	B. S.—F. C.
B-2	0	85,800	0.	0.	102.2	78.8	F. Sy. G.
Annealed, Restored, Hardened, Tempered, Bar Stock and Welds							
B	0	84,700	0.	0.	101.0	100.0	F. C.
B-3	0	54,500	0.	0.	64.9	64.4	P. S.
B-3	0	102,000	0.	0.	121.5	120.5	P. S.
B-3	0	141,000	0.	0.	168.0	166.5	P. W.—F. Sy. G.
Average Efficiency					118.1	117.1	

**THE RESULTS OF TESTS MADE OF THE STUDENT'S WELDS
 AFTER VARIOUS TREATMENTS**

results for the bar stock given the same heat treatment as the accompanying welds. This arrangement is supposed to be the simplest method, whereby one can tell at a glance just what the bar stock withstood under the same treatment.

As seen in the tabulations, there are two efficiencies given, one that of the Bar Efficiency, while the other is known as the True Efficiency.

The "Bar Efficiency" is the efficiency as obtained by comparing the ultimate strength of the treated specimens with the ultimate strength of the bar stock just as it came from the market without any heat treatment.

The second efficiency, that of

$220 \times 70 = 15,400$ watts. = 15.4 K.W.
 $.00972 \times 15.4 = .149688$ K. W. hours.
 Cost of electric current = \$.10 per K. W. (hour).
 $.149688 \times .10 = \$.015$ cost of current (per one weld).

Assume price of labor for operator = \$2.50 per day.

Total time for labor for one weld = 52 sec.
 $52 : 3600 = .01443$ hours to perform one (weld)
 $.01443 \times (\$2.50 \div 10) = \$.0036$ cost of (labor).

Cost of labor \$.0036
 Cost of current .0150

Total cost of one electric weld = \$.0186

Cost of Good Blacksmith's Hand Weld:

Average time for blacksmith to make weld = 12 minutes per weld.
 Assume blacksmith's wages are same as electric operator = \$2.50.
 12 min. = .2 hour.

TABULATED RESULTS OF TRUE EFFICIENCIES

Heat Treatment	Jernberg	Electric	Student	Final Average
Annealed	86.8	102.4	82.0	90.40
Annealed, Restored	93.4	87.9	?	90.65
Annealed, Restored, Hardened	88.1	91.7	78.8	86.20
Annealed, Restored, Hardened, Tempered	98.4	92.0	117.1	102.50

The above tabulated efficiencies are only for what is called the true efficiency, that is, the efficiency as obtained by comparing the ultimate strength of the weld with that of the bar stock that was given the same heat treatment. The figures are the summation of the average efficiencies as obtained from the preceding pages.

treatment on the efficiency of welds.

As seen from the tabulated results and also from comparing the fractures or grain of the test pieces as shown in the photograph of the fractures it is clearly seen that heat treatment makes all the difference in the world in the efficiency of welds.

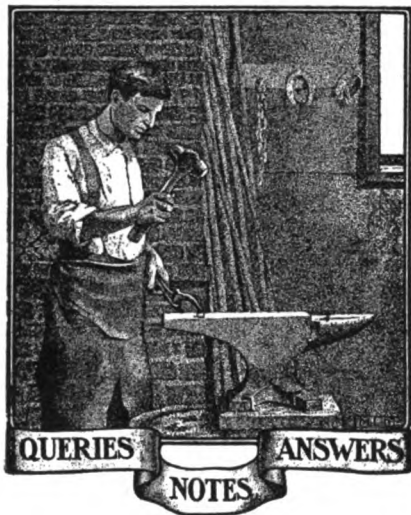
The chief results, briefly stated, are that the efficiency increases directly with the number of heat treatments. Thus the specimens having the four heat treatments give the highest average efficiency.



The peculiarity that the annealed electric welds give an efficiency higher than the heat-treated electric welds is accounted for in the fact that the annealing of these welds was not done thoroughly, that is, the whole of the bar stock was not annealed as should have been, just as the hand welds were thus annealed.

Taking all things into consideration it is seen that the final averaged efficiencies increase with the heat treatments given, thus even going above 100%, which may, perhaps, seem rather absurd, but which is in reality true.

Attention is again called to the photographs of the fractures, especially to the fractures given the third heat treatment. Some people may claim that welding spoils the steel, but these photographs show that such is not the case, but that the steel can be restored to its original quality if not even better.



Wants a Good Spelter.—I am in the rubber tire business and have been up against it in getting a good spelter for brazing the wires. Would ask if you can help me out, as I have seen some good replies in your paper.

C. A. THURBER, New York.

Automobile Wheels and Brass.—Kindly place the following questions in the columns of your journal: Will some Brother kindly advise me the best method to use in truing up an automobile wheel? Also how to straighten brass.

LOUIS WORAREK, Missouri.

A Welding Compound for Plow Steel and for Tires.—Two lbs. of Drillings, One lb. of Sand, One-half lb. of Carbonate of Iron, One-half lb. of Sal Soda, One-half lb. of Borax. Mix these ingredients and stir thoroughly with a hot iron, and then crush to a fine powder. This makes an excellent tire and plow welding flux.

WM. C. LEBOW, Missouri.

Tempering Locomotive Springs.—I would like information in regard to locomotive springs. I am repairing springs in the railroad shop and should like to know just

exactly what tools are necessary to do this kind of work properly. I use fish oil for tempering, but do not get the desired results. I will appreciate all the information you can give me on tempering and repairing springs such as I have described.

H. G. CARR, Pennsylvania.

A Tire-Cooling Query.—Will you kindly answer through the medium of your valuable and widely read paper: Why is it that some tires become wider on the side facing the tire platform when setting them hot while others remain level? We tire our wheels on an iron platform which is lowered into a pit of water below the platform as soon as the tire is on. The tire, therefore, is cooled evenly.

Thanking you in advance for any information in this line we remain,

VAN NIEKERK BROS., South Africa.

A Scientific Horseshoer.—My definition of one kind of a "scientific horseshoer" is:

One who buys his stock at the local hardware store; one who can neither level the shoe nor the foot; can't nail a shoe on so that it will remain on long enough to get bright; lies about his competitor constantly; has about four-fifths of the work he does on his books, and collects about one-fourth of his accounts; and last, but not least, cuts prices in order to get any work at all.

There are a great many of this description posing as "scientific horseshoers."

C. P. HARDY, Nebraska.

Cement Floors Again.—Some of the boys have been asking about cement shops and floors, and I will give my experience in that direction.

For walls, roof and main part of floor it is all right, but if you have any regard for your feet I would suggest putting in a wooden floor where you will have to stand. The cement floor has a tendency to cause a sore and lame feeling in the feet and also a sort of heavy feeling almost to the knees. These floors are also very hard on one's shoes, on account of the roughness, which quickly cuts through the leather.

H. N. POPE, Connecticut.

It Helps Him.—Your May issue reached me this week, and once more I am impelled to acknowledge the really splendid quality of your paper. IF (I wish to emphasize that little word) every blacksmith would but read the articles you take the trouble to publish for our benefit, "Our Journal" would soon find its way into every forge, informing and educating the members of the craft on all matters of practical and material interest, as well as keeping them "abreast of the times." I hold myself your debtor on account of "Our Journal." I welcome it and read it, and in the latter fact, I have a liberal education on many aspects of the trade. I have been at the trade 35 years.

ROBERT WATSON, New Zealand.

On the Subject of Interfering.—I do not agree by any means with the opinion that some correspondents give in regard to shoeing, especially for interfering, and in which some advise to lower the outside of the foot, and all that I would ask of them is to try it on themselves.

I find with the greater number of horses that are brought to me with pasterns cut that the outside of the foot is already too low. If, then, to stop the interfering, why lower the outside? I'm from Pennsylvania, not Missouri.

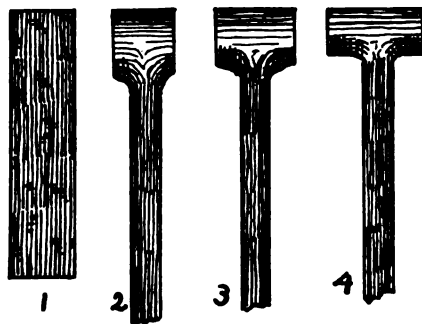
One other thing that I have never seen explained to my satisfaction is why the tip or clip, as some choose to call it, is turned on the toe of the shoe? I put them on if customers want them, but have never yet found anyone who could give a satisfactory

answer as to why this is used. Any discussion or information on this subject will be appreciated.

ERNEST FINLEY, Pennsylvania.

Two Special Jobs.—In reply to Mr. Gretton's queries in the July number I will attempt to tell how I would take care of the two jobs which he mentions. I notice that Brother Gretton lives in England, while I live in a part of New England that is rough, stony and hilly and, naturally, very hard on mowing machines. When I was in business it was necessary to make from two to six connecting rods a day during the haying season. The rods here for two-horse mower are made somewhat different from your drawing. My method is to take $\frac{1}{4}$ -inch machine steel, upset $1\frac{1}{2}$ inch from the end and turn to a square 2 inches from the end. The hub is 1 inch long. I set the bolt header for the hub, and this leaves 1 inch to drive down and flatten. Cut thread on end and the job is finished.

I never weld rods, because I think you get better satisfaction in making new ones. (Perhaps that is why I make so many.)



FORGING RODS FOR A TWO-HORSE MOWER

To forge your rod, take a bar of $1\frac{1}{2}$ -inch soft steel, draw out the rod to size and then cut off $3\frac{1}{2}$ inches of the square part. Put in bolt header or swedge block, and head down and swedge to size as shown.

Regarding the springs I would heat and bend to shape, then harden in oil and also draw the temper in oil. Now if we look on page 256 of the July AMERICAN BLACKSMITH we will see where Mr. Gough has given a practical explanation of testing oil to get the proper temperature for springs. I have nothing better to offer.

I would be interested in knowing how you do these jobs yourself, Mr. Gretton.

DAYTON O. SHAW, New Hampshire.

Working Overtime.—I have been reading your publication for some time, and am certainly delighted with it. The articles in it have opened my eyes to the fact that I have not known how to keep accounts, and, therefore, I want to say that I am interested in accounting systems.

In reply to Mr. Albert Meier's query regarding the idea of working overtime to please customers, I will give my method of dealing with these "late comers." I have had customers call me to the 'phone at night as late as seven o'clock requesting me to shoe a horse for them that same night. In reply, I tell them that my shop is open from seven A. M. to six P. M., and that during those hours I am there to do business, and that if I were to work nights as well as days, I would not be able to turn out good work. I have never lost a customer by refusing to work at night. A little explanation of this kind will usually make them plan to have their work done during working hours.

AMBROSE C. DUNSTON, Michigan.



Two Welding Pointers: Welding Automobile Springs.—Replying to Mr. W. H. Mills of Texas regarding the welding of automobile springs I will give my method:

Upset the ends slightly and scarf as usual. For lap weld take a piece of Laffitte welding plate and insert between the lap, put into your fire with the coldest leaf underneath. Be sure to have a good fire, so as to get the heat in the proper place, and when the heat is of an orange color press together with a pair of tongs while in the fire. This will press them securely, and they can remain in the fire, because your welding heat should be allowed to drop quite low and should insure a solid weld.

Welding a Mowing Knife.—I scarf in the usual way as for lap weld and put both in the fire with the scarf on top, add some compound composed of fine iron drilling, borax and a little sal-ammoniac mixed together. Then turn them over a few times with lap down before taking from the fire

point of stick certainly went down with a jerk. He knew and I did, also, just where the main was located.

This man was also asked to locate a well and did so, telling the party where to dig, how deep to go and that they would find good water. They did as he instructed and the result was just as he said it would be. They decided that if they found water at this depth, perhaps by digging a little farther on they would discover more. They continued digging, but the water found was unfit for use and an old marsh was dug into which spoiled the well. I was not convinced even then, as I knew as well as the diviner did about the formation of the ground and where the well was dug no other result could be expected.

The second man has me guessing yet. He was to find and follow a main running across a meadow to a barn some distance away. Now, he didn't know anything about it except that he saw water running at the

a great many smiths are in the business for their health more than from a business point of view, judging from the way the business end of the shop is carried on.

It has always been my object to get all the work I can, but I expect to make a profit on each job turned out at the same time. I have also found that enough can be saved by such little things as "discounting bills" before they fall due, etc., to pay a large part of the running expenses.

A Foot Stand.—I will follow the example of some of the brothers and send in a few ideas that have been a big help to me and will possibly be of some use to the craft. Article No. 1 at A is a foot stand that I have found to fill the bill better than any other I have ever tried. I consider it superior to others of the kind in that the user can put his foot on either side to hold it down.

A Bolt Holder.—The device at B is a bolt holder that has proven satisfactory and is very simple.

An Anvil Hardy.—At C is an anvil hardy of my own make that has many good points. The engraving is almost sufficient description for making. It has the advantage of saving time, because a tap of the hammer will put it off the anvil and a pressure of the foot will put it into place. A is the hardy made from a horse rasp welded to a $\frac{3}{4}$ rod; B is spring holding hardy in place; and C is foot lever to put hardy on anvil.

An Axle Truer.—At D is shown what I think the best idea. It is a tool to true buggy axles without removing the axle from the buggy (which has always been the biggest part of the job). The tool is made from an ordinary buggy axle and can be made by any blacksmith as follows: Cut the spindles from the axle and then bend to form the stub A. Then bend for the part B and weld the two ends at C. Then comes the hardest part—that of splitting and spreading the two thicknesses of the axle at B—one part to go on each side of the axle when in use and to allow the plug D fit under the axle. D is simply a piece of $\frac{3}{8}$ by $2\frac{1}{2}$ by 6 inches long. The part E does the work after the tool is put on the axle. This should be tightened on the end of the axle and will true the axle to any angle if the part B is made correctly. An axle can be straightened anywhere within 18 inches of the end, and they scarcely, if ever, bend any other place.

I carry gasoline engines as a side line, and I think the farmer is beginning to awaken to the benefits of power on the farm. I know I have never had cause to regret handling engines as a profitable side line.

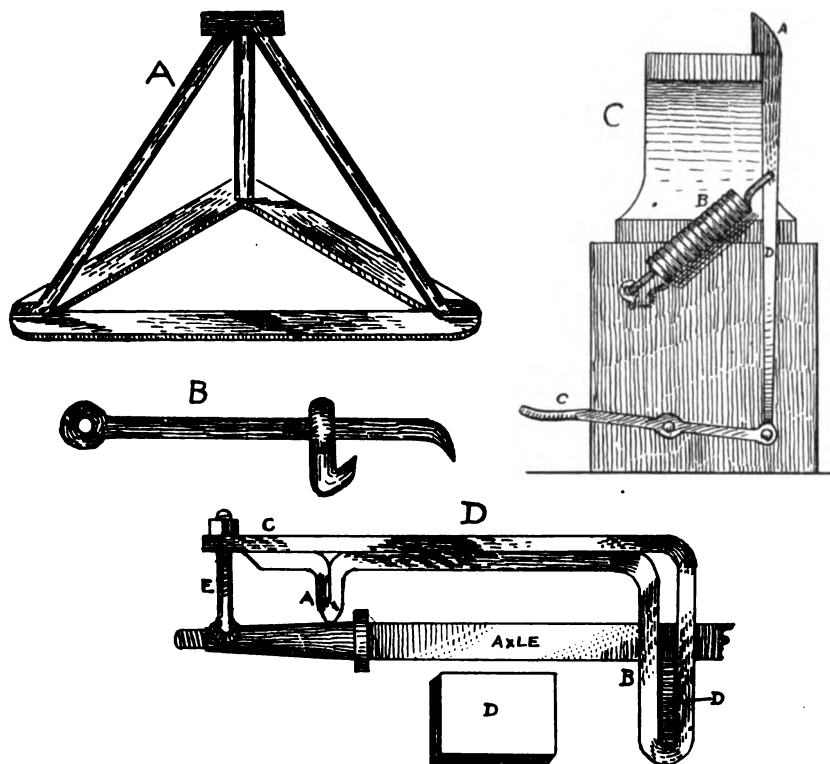
E. E. ROBERTS, Indiana.

From Far-Away Australia

I would like to ask a few questions on various subjects through the columns of your valuable paper.

In the May issue I notice a recipe for a firepot mixture, which implies, of course, that the same is in demand.

A Question on Tuyeres.—Can any of your readers tell me how long an American tuyere will last? Some time ago I saw in a local trade journal that the American tuyere burned out in the course of a year. Is that a fact? As far as I can ascertain there are not a great many of them in use in this country, though they are increasing. The water tuyere is still mostly used. Five months ago I made a tuyere from the directions of Mr. W. H. Gunn in the April number (1912) of THE AMERICAN BLACKSMITH, and can say that it is a complete success. The heat is quicker and far more intense, but I think a firepot would improve



SEVERAL HANDY SHOP DEVICES BY AN INDIANA SMITH

to weld. I can do this without any assistance and find it to be the best method I have ever tried and also the quickest. The principal point is to have a good clean fire.

EDWARD LARSON, N. Dakota.

The Divining Rod Again.—Here is the divining rod subject again, and while I know the rods have nothing to do with smith work, perhaps the Brothers will have no objection to a little diversion from their line occasionally.

I have always been very skeptical concerning rods and spirits in general, but when we see anything actually performed we are sometimes forced to believe there is something doing that is beyond our comprehension.

There are three friends of mine here who claim to possess the art of finding water with a crooked stick, and recently I asked one of them to show me how he did it. He was to locate the street water main, so he took the stick in hand, holding by both prongs with his little fingers outward, back of hands up, walked a short distance and the

barn and was told where but not how it came there. This man picked up the line of pipe correctly, started across the lot, and when about half way across stopped and said "You are fooling me, that water doesn't come this way." When told that it did, he replied, "Well, I will find out." He then started back and picked up the pipe again, followed it to where he had lost it before and again remarked that we were "fooling him," but when assured not, started to work again and followed it correctly to its finish. Now the cause of the difficulty was that the pipe took a direct turn into a house and then to the barn, but he certainly followed it to its end. I think a stunt of this kind would make any doubter believe.

H. N. POPE, Connecticut.

Several Handy Shop Devices

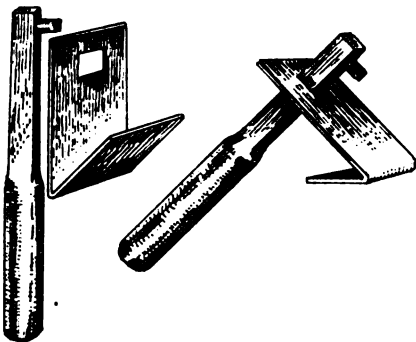
Shop Management.—I have been deeply interested in your articles on shop management, and believe they are a benefit to anyone reading them. It does seem that



it still more, and would like to know if there is a successful method of making one. After making the tuyere I made a firebed of firebrick, following directions from a book on blacksmithing, but it was a complete failure. It gave an extremely intense heat for a few hours and then the clinker stuck. During dinner hour I let it go cold, and on attempting to light it I lifted the whole lot (clinker and bricks) in one lump. I then made one (with many misgivings) of $\frac{1}{2}$ -inch iron plate, which also was a big improvement for a short time, but at ten o'clock on the first morning there was a hole burnt through the front of it, so I took it out and am now working with the tuyere as I first made it (without any firepot).

Can any reader tell me if a firepot is an advantage or would an iron one last any length of time with a lining as given in the May number?

Springs and Spring-Welding.—Another subject I am interested in is springs, and I may say I have never yet had a repaired spring break nor a new one, either, as far as I know. I temper by hardening in water and drawing to a flash with oil and invariably meet with success. For a welded leaf I give it as much hardness as can be gotten with the hand hammer, and as I've been nearly 20 years at the trade and the welds stand I presume that I'm on the right track. I know a smith who is supposed to be very good at springs, and in tempering he simply cooled in oil from a good red. The result was that a spring out for the first time was broken in every leaf. Another repair job by the same expert (?) had a new leaf put in and, as usual, simply hardened in oil, and no subsequent drawing (the oil, by the



AGOOD PLOW-BOLT HOLDER

way, is not warmed except what it gets from the work being done in it), it had a $\frac{1}{4}$ -inch compass between the leaves and snapped with the center bolt being screwed up. Can any of your readers confirm me that this is *not* the correct way to temper springs? The steel used was mostly Toledo brand—Sheffield make.

Automobile Springs.—I would like to be informed if a motor spring requires any less drawing than a buggy spring? I say no. To my mind any spring that is hardened and drawn to a flash and then tested and proved correct, which will not stand up to the job it is put to, requires more body, i. e., either more leaves or wider stock, and any greater degree of hardness would cause it to snap. Is not that the correct view? Although I have been very successful with springs I would like the confirmation by a spring specialist, as I do not pretend to be a specialist myself.

Welding Tires.—I will explain a method I have of welding tires that may be of help to some readers. In this country we seldom

get tires lighter than $\frac{3}{8}$ and I have used this method successfully on tires of that thickness and also up to $\frac{1}{2}$.

After your tire is bent true you will save time if instead of scarfing you place tire in the fire with ends butted together and have a good clean heat. Then, with the striker's help, lift out of the fire quickly, knock ends apart and lap one end over the other about one inch, bending the underneath end projection over the edge of the anvil, and knock down the top with the pene of the hand hammer. These blows will make the top scarf and weld it at the same time. Now turn the tire on edge and with a sharp, hot chisel cut off the projection on a slant; this makes the bottom scarf. Then take a second heat and finish to required length. In this way I can weld a tire in the same time as it requires in scarfing alone with the old method. A little practice will teach the amount of stock required for the weld, and if weld is inclined to be a little thin a light pull with the shrinker will pull it up nicely. This is done with the second heating, and by working quickly a neat, perfect job will result. This has proven the best of several methods which I have tried. The same method holds good on heavier tires, but in that case it requires another helper, who cannot always be secured, so I proceed another way: The two ends are given a good bevel in opposite directions; the heat is taken and tire placed in welding machine and gripped; a light tap causes the left-hand end to drop, and a turn of the handle forces the right-hand end slightly on top of the other, that movement being helped by the beveled ends. While your helper continues at the handle you keep the sledge going and you will have a perfect weld.

The Forge Fire.—With regard to the fire: Those readers who experience difficulty in making good welds will probably find that if they study their equipment, three points are necessary for success—a good blast, good tuyere and good fuel. If these three items are right, then common sense will help you the rest of the way over a difficult job. A word about fuel: It is not always easy to obtain good coal, so I would advise giving coke a trial and save yourself needless worry. In order to get the best results it should be crushed rather small, and the result is a quicker, cleaner heat and sounder work. Give it a trial and you will not return to coal. Neither will you have the painters after your scalp, because of smoke reaching their department. However, if you still desire to stick to coal, a slight sprinkle with the coke will do no harm, but by all means give the coke a trial and note the result. It needs a good blast and a deep fire. NEW READER, Australia.

How to Make a Good Plow-Bolt Holder.—I see that Mr. F. H. Pettit of Oklahoma wishes a good plow-bolt holder. As I have not seen any described like the one I am using and get good satisfaction from, I will explain how to make the kind shown in the engraving.

Take a piece of steel 2 or 2 $\frac{1}{2}$ by $\frac{1}{4}$ inches and about 4 $\frac{1}{2}$ inches long, then drill a $\frac{3}{4}$ inch hole in one end as shown. Square the hole, and bend about an inch of the other end over for a hook. Then take a piece of iron or round bar steel about $\frac{7}{8}$ or one-inch by two feet long, and square about a foot at one end or sufficiently large to pass easily through the hole in the piece first made. Drill a hole in the flattened end of the bar about $\frac{1}{2}$ inch back from the end for a $\frac{3}{8}$ inch steel pin. Sharpen the pin and allow it to project about an inch from the bar. The steel will slip

back and forth on bar, and you can hold bolts on a new or worn out share with this holder.

JOHN BRIGGER, Missouri.



The Care, Repair and Operation of the Automobile—9

(With Special Reference to Overland Cars)

Winter Driving

For driving in winter or on slippery roads the use of tire chains is advisable. You can sell them to your motoring customers if you keep a stock on hand. The chains should be properly adjusted. When they are applied too tightly they will cut the tread and render it useless in a short time. Adjust the chains so that they will shift around over the tread, to distribute the wear.

In an emergency, as when the car has become mired or the road is so slippery that the wheels cannot secure sufficient hold to move the car, a rope wound around the rear wheel in between the spokes (Fig. 1) will be found a simple and effective means of getting started.

Non-Freezing Cooling Solutions

Whenever the temperature approaches 40 degrees Fahrenheit above zero the cooling system should be made frost-proof by mixing a non-freezing substance with the water. Wood alcohol or denatured alcohol is best for that purpose.

The following table may be used in estimating the quantity of alcohol required for different temperatures:

Capacity of cooling system, 4 $\frac{3}{4}$ gallons:

If 4 pints alcohol are added to the



water it will not freeze at 10 degrees Fahrenheit above zero.

If $7\frac{1}{2}$ pints alcohol are added to the water it will not freeze at 5 degrees Fahrenheit above zero.

If $9\frac{1}{2}$ pints alcohol are added to the water it will not freeze at zero, Fahrenheit.

If 15 pints alcohol are added to the water it will not freeze at 25 degrees Fahrenheit below zero.

Capacity of cooling system, 6 gallons:

If $4\frac{3}{4}$ pints alcohol are added to the water it will not freeze at 10 degrees Fahrenheit above zero.

If $9\frac{1}{2}$ pints alcohol are added to the water it will not freeze at 5 degrees Fahrenheit above zero.

If 12 pints alcohol are added to the water it will not freeze at zero, Fahrenheit.

If 19 pints alcohol are added to the water it will not freeze at 25 degrees Fahrenheit below zero.

Since alcohol evaporates more quickly than water, any loss should be replaced with equal parts of alcohol and water.

The use of powerful chemicals, like calcium chloride, sodium chloride, or of glycerine in cooling solutions, is apt to have troublesome consequences, because the chlorides attack the metal of the system while glycerine will act as a solvent of the rubber connections

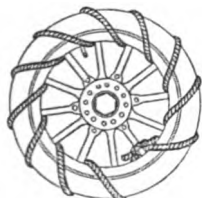


FIG. 1—WHEEL WITH ROPE TO PREVENT SKIDDING

and is troublesome in other ways.

If the cooling water should freeze through neglect of ordinary precautions do not attempt to thaw it out by starting the motor, but thaw it by putting the car in a warm place.

During cold weather the motor is sometimes hard to start after the cylinders have become thoroughly chilled. The remedy in a case of this kind is to introduce a small quantity of gasoline—about a teaspoonful—through the priming cocks direct into the cylinder. The rich mixture secured in this way will start the motor. Once started the cylinders will warm up and continue to work without trouble. In most cases the closing of the air shutter in the carburetor will be sufficient to secure a start.

It is always well when making a

stop, to cover hood and radiator, which will give considerable protection from the likelihood of freezing and also make a new start easier.

A cloth wrung out in very hot water and held around the carburetor will also facilitate starting in extremely cold weather. This may become necessary in extremely low temperatures when water which may have entered the float chamber of the carburetor and separated from the gasoline is likely to freeze and clog up the spray nozzle.

Cold-Weather Lubrication

The oiling system deserves some attention during the winter. Do not use too thick a lubricant, for the cold will congeal it still more.

When starting in cold weather run the motor slowly for a short time until things are warmed up sufficiently for the oil to flow freely.

Winter Storage

Except in localities where winter temperatures are apt to be extraordinarily low or during periods of unusually heavy snow-fall most motorists prefer to use their cars throughout the winter.

There are some owners who desire to lay the car up for a part of the cold season, with every prospect of obtaining the best service from it when it is again put in commission, and for the auto-repairer who does this work the following advice will be of value:

Remove the tires from the wheels and find a suitable place for them where they will not be subject to extremes in temperature. For extra good care wrap the tires in canvas or paper, previously sprinkling them well with French talc, soapstone or sulphur.

If you do not wish to remove the tires you should at least jack up all four wheels and let the air out of the tubes.

The inside of the wheel rims should be cleaned thoroughly and a coat of enamel applied to the inner surface where the tire comes into contact with the rim, to prevent rust which has a damaging effect on the fabric of the tire.

There are various preparations used to preserve the brightness of metal surfaces, such as lamps, radiators, the rims of windshields, etc., but the cheapest is common slab oil which may be purchased of the Standard Oil Company. Where this cannot be procured, gun grease or

even vaseline will afford excellent protection.

The top of the car should be opened and cleaned. The axles should rest on wooden blocks—(Fig. 2), particularly if the storage place is apt to be damp during the winter.

Of course the water should be drained from the cooling system, to

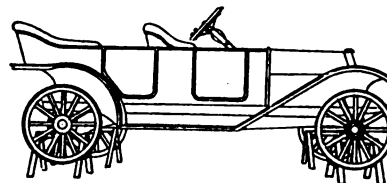


FIG. 2—CAR READY FOR WINTER STORING

prevent its freezing, which would do considerable damage. Open the drain cock of the radiator, and to remove the water as completely as possible rock the car a few times. It may happen that a little water remains in some portion of the cooling system, and the owner who takes no chances should pour about a quart of denatured or wood alcohol into the radiator after the water has been drawn off. Then, even if a little water should have remained in the piping or jackets, its admixture with the alcohol will absolutely prevent freezing.

This method is much better and safer than the one advocated occasionally, which consists of draining the water from the radiator and jackets and then running the engine for a short time so that the resulting heat may dry the remaining water. With the latter method there is always danger of overheating the engine, for which reason it is best to avoid it and to rely on the alcohol.

If the car is to remain out of commission for a considerable period it may be well to fill the cylinders with kerosene.

Before putting the car again into service it is well to go over it carefully. Tighten all nuts, clean the transmission and differential and repack them with grease.

Examine the clutch lining, and if necessary renew it.

Drain the oiling system and refill.

Take up the steering gear and go over the adjustment of the brakes.

Take a look at the wheels. If any of the spokes have become loosened, due to shrinkage of the wood, tighten up at the flanges.



Clean the wheel bearings and pack them again with lubricant.

(To be continued)

Welding Automobile Springs

A. H. BROWN

Having handled a large amount of this work, I will endeavor to explain some points regarding the work, as I have tried welding automobile springs in every way that was ever used for welding iron or steel.

During the past five years I have

break in the center of the weld, and when the break occurs Mr. Auto Owner says things that Mr. Webster never heard of when he prepared his dictionary.

Therefore, the split weld used and conceded to be the best on edge tools, tool-steels and shafting takes too much time to prepare, and although it works well it is no better than the common lap weld.

Now I will tell how I weld my springs: I place both pieces edgewise on a piece of sheet iron and mark the curve or set of the leaf

I use Boraxette for welding, but have used plain borax and also Climax Compound with equal success. But I think those things are merely a matter of practice and getting accustomed to them. The success in welding springs is mostly in proper heating and careful working.

I think the brothers should be interested in this profitable work. I am rarely over twenty minutes welding a leaf from start to finish, and charge from 35 cents to 50 cents a leaf. I have even received larger fees on special cases of the kind, but if a man is going to take the spring from under the car himself, it is policy to charge by the hour.



MR. J. A. LOFFELMACHER'S TRACTOR ON THE WAY TO MARKET
WITH A LOAD OF HOGS

welded nearly two thousand automobile spring leaves, using different methods and preparing my welds in all the different ways known to the trade. I have concluded after all the experimenting, that the old lap weld gives the best satisfaction from all points of view because it is the quickest, cheapest, and is as durable, neat and as permanent as any, and I find that I can get my heat better with this method than with others, and I will explain some of the reasons why I have discarded the other methods:

First—I find that in using a split weld, such as are used on tires, the center does not weld as solidly as it does in the softer metal, and consequently it leaves a weakness.

Second—I find that in using a lap weld, and riveting the parts to hold them in place, very frequently the rivet does not weld except on the surface, therefore causing a cold shut in the center of the weld. Then you have a good start for a new

with a pencil. Then I have a pattern to set it by when finished. Then I heat my pieces and upset the ends and scarf them as in any lap weld, making the end of my scarf quite thin, as it hammers in easier when thin. Then I proceed to take my welding heat, using my welding compound, and when ready my helper takes one piece and I the other and I catch the edge of both scarfs with the pene of the hammer with light, quick blows. Then my helper comes in with his sledge, and we work the weld down to size. I generally take a second heat as it works down easier and gives a chance to get the scarfs worked in smoother than by doing it all with one heat. I also think that hammering spring steel too cold has a tendency to jar it apart. After the weld is worked down, I set my leaf from the pattern previously marked out and let it cool. I never straighten a leaf more than is necessary to work it properly on the anvil because it saves time in resetting it.

Marketing Hogs in an Automobile Tractor

J. A. LOFFELMACHER

We have been using a three-ton Avery Farm Truck for over a year, both for farm work and going to town. We hauled 4,000 bushels of wheat a distance of twelve miles to market. We make the trip with 110 bushels of wheat in about one and a quarter hours. We make from four to six trips a day. We can accomplish as much work with our truck as with four or five teams of horses on the road, besides saving a man to each team. I have made a test of hauling 120 bushels of wheat twelve miles each way, and the average expense for oil and gasoline was about 95 cents. We pay 16 cents per gallon for gasoline.

We also have hauled 72 hogs in four trips, with the wagon trailer attached, a distance of 24 miles to the round trip, in one day so as to make shipment in the one stock car at night. Each hog weighs about 450 pounds. The tractor bed is on springs and will carry the load without any jarring or shaking.

My large farm truck is a big money-saving machine, as it does as much work as five or six teams and the help required with them. It is not subject to the annoyance of flies and never gets lazy. We are not obliged to use a whip half of the time nor lose time by standing in the road at intervals. The throttle is simply opened and the truck is on a run. The big truck has certainly given entire satisfaction up to the present time, especially when considered with horses.



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The Leading Article

The feature article this month is a description of the very excellent shop system used in the big smith shop at the Brooklyn Navy Yard. This shop (among several others in the vicinity of New York) was recently visited by the editor, and the actual workings of the system explained. It should prove of interest to every reader, to know how Uncle Sam keeps track of his smith-shop work; and to those readers who are in the offices, and at the forges, in the big shops, this article should prove both profitable and interesting. There are very few, if any, shops where as complete a routing and distributing system is used, as has been installed by Mr. Henry at the Brooklyn Navy Yard blacksmith shop.

Thornton Back Again

Yes—our old friend is with us again, with something brand new. His "Thoughts On Timely Topics" are to be just what the heading says: "Caustic Censure and Cheery Comment." You know there are a great many things about every business and every trade that are not exactly what they should be; and, then, there are other things that are fine, and we like to hear about them occasionally. So Thornton is going to get after both these extremes in the smithing craft. He's going to deliver some straight-from-the-shoulder stuff, on matters that need bettering—and we've told him to hit hard; so look out! At the same time, he's going to hand out some real nice bouquets, whenever and wherever they're needed. So keep your eyes on Thornton's column. He knows pretty well what matters need bettering, and where a bouquet will help along work already good.

Subscription Agents

When a stranger solicits your subscription to THE AMERICAN BLACKSMITH, or any other publication, insist upon his showing you absolute proof that he is an agent in good standing and is employed by the publication which he represents. Don't, under any circumstances, give the man your money if you are not sure that he really works for the paper he says he does. No matter what the man offers you—no matter what price he makes—no matter what premium he promises to send—DON'T GIVE HIM YOUR MONEY IF YOU ARE NOT SURE.

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That Prize Contest

The prize letter contest ends December 31st. Get your letter in before that date. Remember, we want clever letters—original letters—humorous—grave—good, pleasant—reading letters. Make up your own letter—the best, most clever, you know how. But get busy now; there are not many days remaining; and don't forget the requirements of the contest. Read all about the contest on page 46 of this issue—and get busy.

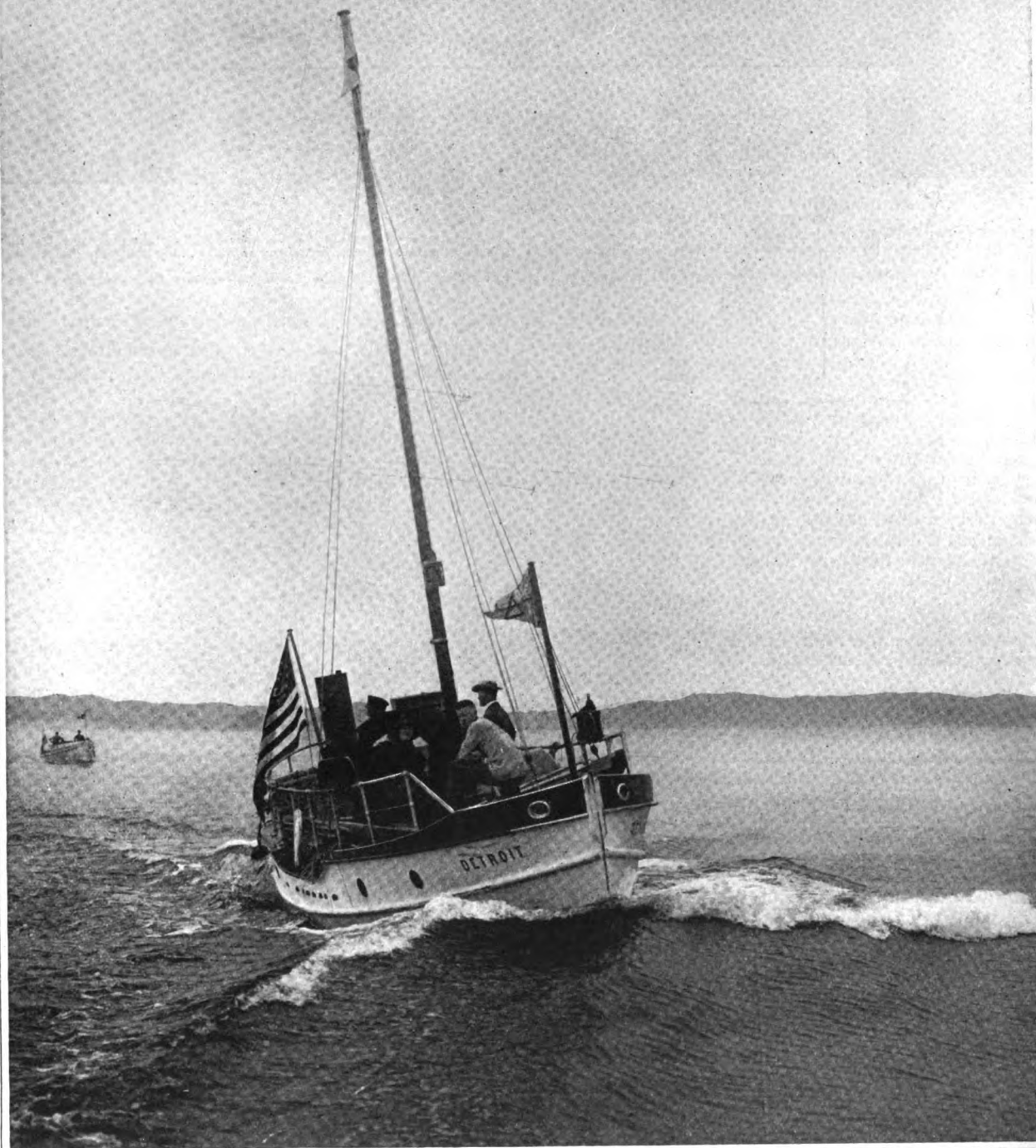
The Automobile Department

This section has been changed to the last pages of the reading section, as a regular feature. This was deemed best, for several reasons, and we believe all of "Our Folks" will like the change. There will be neither more nor less automobile matter than we believe necessary to meet the needs of "Our Folks"; and, as ever, we will endeavor to publish just the information that is needed by those of our readers who have taken up automobile repairing.

The Kansas State Meeting.

The Seventh Annual Meeting of the Blacksmiths', Horseshoers' and Wheelwrights' Association of Kansas will be held at Salina on November 12th and 13th. The meeting is announced in the fifth annual year book, and great credit is due the popular secretary-treasurer, Mr. Austin English, for the completion of a very excellent and very clever book.

The Association of Kansas deserves a great deal of credit, and especially so Mr. George W. Wilson, its president, in getting a lien law passed in the State. Mr. Wilson piloted the bill and, personally, when lack of funds threatened to leave the bill high and dry upon the rocks of legislative red tape, advanced the necessary money to carry the bill through. The smiths of Kansas should be proud of President Wilson, of the Kansas Lien Law, and of an association that really does things. You, Mr. Kansas Smith, can give the association the support it deserves by attending that Salina meeting—November 12th and 13th.



THE "DETROIT"—THE LITTLE GASOLINE MOTOR-DRIVEN CRUISER
THAT MADE THE TRIP ON LAKE, RIVER AND OCEAN, FROM
DETROIT, MICHIGAN, TO ST. PETERSBURG, RUSSIA—
OVER SIX THOUSAND MILES—WITHOUT MISHAP



System in a Large Shop

The Shop System Used in the Large Blacksmithing Plant at the Brooklyn Navy Yard

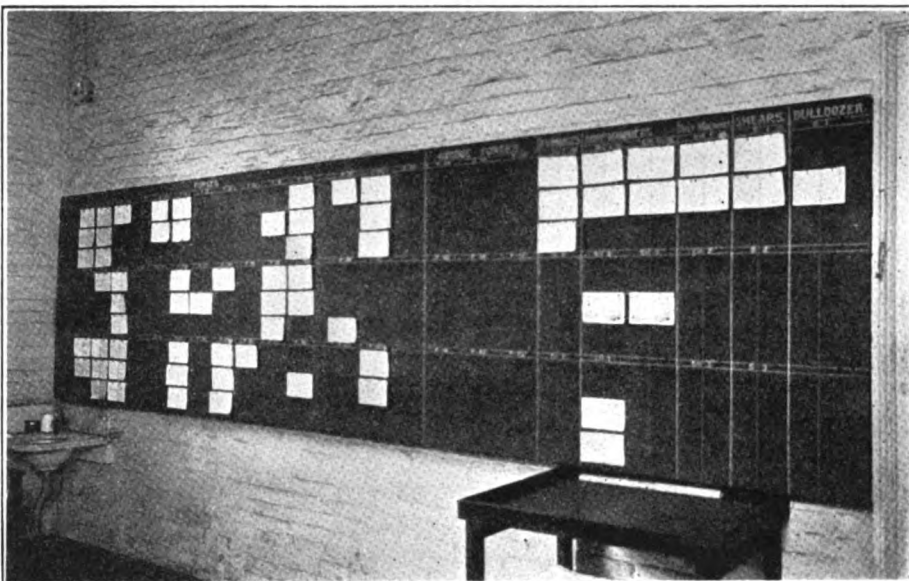
W. O. BERNHARDT*

UNCLE Sam, or more correctly, his very able representative, Naval Constructor S. M. Henry, must be a thorough believer in systematic supervision, in analysis of work, and in scientific management. For these are the things that impress you, at the large, airy blacksmith shop at the Brooklyn Navy Yard.

This big shop is exceptionally clean for a smith shop, and the task of keeping it so is greatly simplified by the use of oil-burning forges, of which there are thirty-seven. In the entire equipment of forty-three forges, there are but six forges burning coal as fuel. These six forges are used particularly on angle work, for which work the advantages of oil are less marked than is the case with solid work.

*The writer is indebted to Naval Constructor S. M. Henry, the originator of the described system, for corrections and suggestions;—to Mr. Williams of the Hull Division of the Brooklyn Navy Yard for permission to inspect the actual working of the system, and to Mr. Hogan, foreman blacksmith at the Brooklyn Yard, for patience and courtesy in explaining this system.

The balance of the equipment part of which work must be done in the smith shop. When either a job



THE ORDER BOARD IN THE FOREMAN'S OFFICE, SHOWING INSTRUCTION CARDS FOR JOBS ASSIGNED

hammers, ranging in size from 400 pounds to two thousand pounds, three bolt machines, one bulldozer and three shears.

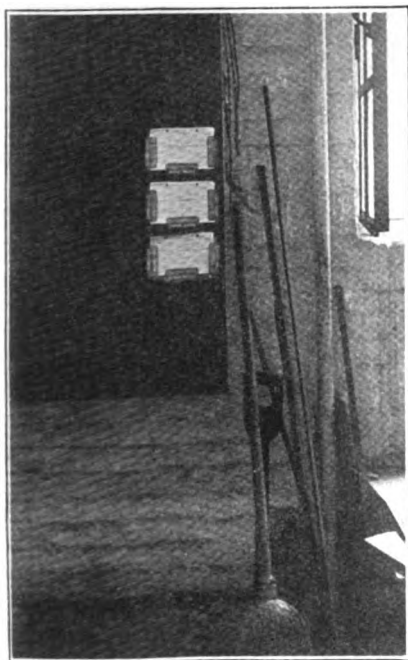
To distribute, locate, and properly supervise the work done in this shop, Naval Constructor Henry has installed a system by means of which the foreman's office has always at hand a visual record of all of the work being done, when it will be completed, and by what machine or forge it is being done. The foreman has a permanent record of the time actually spent on each job or division of a job; the material; and has for prompt comparison, records to show previous time on similar work, if any.

Handling the Work

All work done in the big navy smith shop, originates either as a job order (Fig. 1) from the main office, or as a shop order (Fig. 2) from another shop. The shop orders are, of course, based upon job orders which are originally issued to other shops, but

order or a shop order is received at the foreman smith's office, a material card is made out (Fig. 3), and given the material man. An instruction card is then made out in duplicate—one going to the forge man or machine man who is in charge of the gang that is to do the work—the other card is placed on the order board (see engraving) in the foreman's office.

In Fig. 4 is shown the face or instruction side of the instruction card. The other side of this card is divided into six columns, and is ruled. On this side, the workman writes the day, month, year, the check number, and the hours and minutes spent upon the work. Each man in charge of a gang has provision at his forge, furnace, or machine, for hanging up the instruction cards he receives (see engraving) which, upon completion of the job, are returned to the foreman's office. There are three pockets for cards—one for the job card for the work which he is doing, the



HOW THE WORKER KEEPS HIS CARDS BESIDE THE FORGE



JOB ORDER

JOB ORDER NO. _____

TITLE _____

SHIP OR OBJECT _____

APPROPRIATION _____

AUTHORIZED BY _____

NAVY YARD, NEW YORK

19____

The _____ will be responsible for carrying on and

completing the following:

SPECIFICATIONS

When completed the _____ will sign here.

Begun _____, 19____ Completed _____, 19____

ESTIMATED COST—ESTIMATE NO. _____						NO. OF DAYS
NAME OF SHOP	LABOR	INDIRECT	MATERIAL	TOTAL		
						Copies of this order have been sent to the officers and foremen whose names follow.
TOTAL						SIGNATURE

FIG. 1—THE JOB ORDERS ORIGINATE IN THE MAIN OFFICE AND MAY SPECIFY WORK IN SEVERAL SHOPS

second for the next job for which he has materials and tools, and the third for work for which materials and tools are being collected.

The Route Sheet shown in Fig. 5 is really a large manilla envelope, measuring $10\frac{1}{2}$ by $8\frac{3}{4}$ inches. Upon the face of this envelope are spaces for such notations as will enable the route clerk, or foreman, to see at a glance just exactly the condition of any job. There are columns for noting if plans have been ordered; if received; if work has been routed; and other details, from the beginning of the plans to the completion of the work. Into this envelope are placed, at the completion and delivery of

the work, all cards, slips and data sheets pertaining to the items listed on the face of the envelope.

The Order Board

This board is located in the foreman's office, and as shown in the engraving, is divided into spaces for the various forges, furnaces and other machines. Each forge and machine is numbered, and under the number of each are three sets of hooks, upon which to hang the instruction card for such work as is being done, or as has been assigned to that particular forge, or machine. A duplicate of these cards is, as has already been described, sent out to the man at the forge, or machine.

This order board, with its various divisions, and the data cards, is a simple, efficient indicator, of just what work has been planned for each forge and machine, and thus enables the foreman to so arrange and distribute the work, that no forge, machine, or gang, will be crowded while another gang has a scarcity of work.

In conjunction with the order board, there is a file cabinet (see engraving), where the route sheet envelopes (Fig. 5) are filed. These envelopes are filed according to ship. For example: the envelope routing work to be done on equipment for the "Florida," will be found in the pigeonhole marked "Florida." And the envelopes in that pigeonhole will contain all data pertaining to all smithshop repair work done on that ship.

The Results Obtained

First of all, is the systematic supervision of the work. This is most certainly a great improvement over the haphazard method usually encountered in the average smith shop of large proportions. The readiness with which the foreman can assign work efficiently, and with absolute certainty, and know just exactly what precedes any given piece of work, is another advantage that cannot be overestimated. Then, too, this system insures greater accuracy in the promising of work; and in the actual doing of the work, it

Form No. 124-600-0077-09

NAVY YARD, NEW YORK.

MANUFACTURING DEPT.

TO MASTER _____

J. O. NO. _____ PLAN NO. _____

FOR U. S. S. _____ 100 _____

APPROXIMATION _____

TITLE _____ GEN'L HEAD _____

DESCRIPTION OF WORK

START _____ COMPLETE _____

MASTERS

ORDERED: QUARTERMASTER

LEADSMAN

**FIG. 2—THE SHOP ORDER DESCRIBES
WORK THAT ORIGINATED IN A JOB
ORDER TO SOME OTHER SHOP**

Form H 26

M A T E R I A L

PLEASE PROVIDE FOLLOWING MATERIAL FOR JOB ORDER _____

AT MACHINE NO. _____

No. PIECES	MATERIAL	SIZE	Wt. in Lbs.

CHECK HERE WHEN MATERIAL HAS BEEN DELIVERED
AT MACHINE AND RETURN TO PLANNING ROOM

FIG. 3—THE MATERIAL CARD DESCRIBES STOCK WANTED. THIS AND ALL OTHER FORMS SHOWN ARE MORE OR LESS REDUCED

tends toward greater speed and greater efficiency.

But greatest of all the advantages of Mr. Henry's system is the ease with which accurate records are kept on costs. The backs of the instruction cards show an accurate report on all time; from these, and from the material slips, accurate costs can be ascertained; and as all material slips, instruction cards, orders, etc., are filed, costs can be very easily compared with previous figures, and differences, if any, quickly discovered. Furthermore, the reason for such

differences can be quickly and accurately pointed out, and proper steps taken to avoid such motions and moves as prove unprofitable in the final delivery of the finished product.

This system may appear complicated to some readers, but the actual working of it is quite the reverse. It very naturally requires some time and attention, but such time and attention as it does require are well spent; and the information secured, and the efficient check thus kept upon the entire smithing plant, are worth many times the cost.

INSTRUCTION CARD			
J. O. No.	Rotation No.	Route Sheet No.	Operation No.
Issued	19 By	O.K.'d (complete)	Speed Boss
Word assigned at	A. P. M.	19 By	Gang Boss
Machine set and work accepted by	Speed Boss, at		A. P. M. 19
Work completed at	A. P. M.	19 By check No.	
Item			
<p>The following work will be completed at</p> <p>Upon completion will be moved to</p> <p>Detail Instructions:</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p>			
Reference plan No.		<div style="display: flex; justify-content: space-between;"> Estimated time Actual time </div>	

FIG. 4—INSTRUCTION CARDS ARE MADE OUT IN DUPLICATE—ONE FOR THE ORDER BOARD AND ONE FOR THE WORKER

The original sizes of the several blanks are as follows: The job order blank, $7\frac{1}{2}$ by $8\frac{1}{4}$ inches; shop order blank, 4 by 6 inches; material card, $5\frac{3}{4}$ by $3\frac{3}{4}$ inches; instruction card, $5\frac{3}{4}$ by $3\frac{3}{4}$ inches, and the route sheet envelope, $8\frac{3}{4}$ by $1\frac{1}{2}$ inches.



The Why and the Wherefore of Heat Treatment

JAMES A. RIDGELY, Metallurgist

In heating tool steel, the carbon assumes many different forms, and in heating tool steel of about .9 carbon, it goes through many changes, as outlined:

We will take as an example, a piece of properly annealed tool steel at atmospheric temperature, which we will designate as "zero." The heat will rise uniformly, until it reaches a point at about 1300° F. Here the temperature hesitates and remains stationary until certain internal conditions have been satisfied, when it again rises uniformly to about 1400°F., when the second transformation takes place. The temperature again remains stationary until this has been completed, and it again rises uniformly to about 1550° F., where the third change takes place. These changes have been designated the "recalescent points," and we shall use them as Ac-1, Ac-2, and Ac-3.

If suddenly quenched in water at Ac-3, or 1550° F., the steel will be very hard and coarse, and the metal will be held in the condition in which it was placed by the applied heat. If allowed to cool slowly, the temperature will drop uniformly until

FIG. 5—THE ROUTE SHEET SHOWS THE PROGRESS OF THE WORK AND BECOMES THE FINAL RESTING PLACE FOR ALL CARDS AND JOB TICKETS

As the molecular changes are taking place, from zero to 1550° F., or reaching the recalescent points, the writer will describe the actions of the metal:

On the reverse or decalescent points, the action is as follows: On slowly cooling from Ar-3, or 1500° F., the carbon absorbs one atom of the iron that has been dropped on the rising temperature, and the metal

The question of when we must quench this steel, after it has reached the recalescent point, has been asked many times. We have found that Professors Osmond, Hall, Austin, Brinnell and Chatelier have placed the recalescent point of from .89 to 1.31 carbon steels at 690-C., or 1274° F., and have allowed 30 Cen.,





or 86 F., as the point to quench. This point may be correct on small sections, but the writer has found that it will not do on heavy sections, and finds that a variation of 100° F. can be added to the heat without doing harm to the steel, ranging from .85 to 1.30 carbon, covering tool steel for general work, and finds that steel containing 1.20 carbon can be quenched as high as 1472° F., without injury to the steel.

Automatic Control of Forging Machines

G. W. KELLY

The application of an automatic system of control to any machine is always of interest to those who desire

During the starting operation it is impossible for any damage to be done to the motor or electrical circuit due to overloading, as the current value is absolutely limited by this starting system. There is, however, no delay whatever in bringing the machine rapidly up to speed. Tests, recently made, show that full speed was reached in six seconds from the time the button was depressed.

Let it be realized at the outset that the only thing the operator has to do to start this apparatus, or to stop it, is to press respectively the "start" and "stop" buttons. There is no switch to throw, no lever to operate, and the danger of short-circuit rheostat burn-outs, blowing fuses or breakers, as is possible with

It is, of course, much quicker than either hand rheostat or belt starting can be done with any approach to safety. Another point of very great importance is that should too much material bunch up between the plunger and the dies, or should the machine become choked for any other reason, the operator can instantly open the electrical circuit by a pressure upon the "stop" button, which button, as a safety precaution, projects beyond all other points on the face of the switch. By thus clearing the electrical end of the apparatus there will be no danger when the machine is suddenly stopped from overload or from blowing the circuit breakers back in the power house.

A great deal of the operator's time is saved, aside from the actual time consumed in the starting operation, by having the control right near his hand at the spot where he is working, and he does not have to take any steps to pull switches or shift belts.

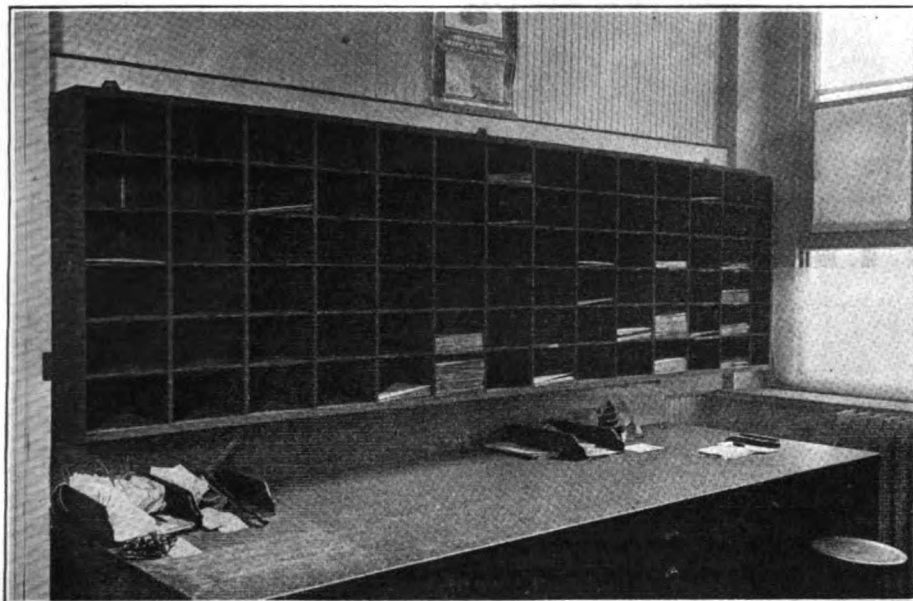
With this control it is possible to "inch" the machine along without the least possibility of damage to the controller or motor; this being a great convenience when setting the dies or adjusting the machine. The current on the controller is broken but at one point and then only in the presence of an effective blowout which immediately breaks even the heaviest arc.

When operating the apparatus a pressure on the "stop" button will, as stated, open the electrical circuit and allow the machine to coast along, and a pressure on the "start" button will immediately bring the motor back into service without a moment's delay.

The operator's time is again saved with the automatic controller because he can start the machine by pressing the button and then turn his hands to the arrangement of his material, getting it out of the furnace, etc. By the time he is ready to make the piece the machine would have reached full speed.

This system of automatic control has been used on 5-inch forging machines for about a year. At times it has been very heavily loaded and the controller severely tested. By the use of special liners the dies used on the 3-inch machine are used as well as the larger dies on the 5-inch machine.

The other machine operated by an automatic controller is a 3½-inch



THE ROUTE SHEET CABINET IN THE PLANNING ROOM WHERE ALL ROUTE SHEETS ARE FILED FOR READY REFERENCE

to advance the efficiency of the shop.

The machine I shall first consider is a 5-inch universal forging machine driven by a 40 h. p. direct current 220 volt motor, geared directly to the crank. It was found possible by coring or lining the gears with wood to very greatly reduce the noise.

The controller is mounted on the wall of the shop some distance from the machine and is operated by a push button switch attached to the machine near the clutch of locking lever. A slight pressure upon the "starting" button will energize the controller and cause a series of electrically interlocked relays to operate and short-circuit sections of resistance in the armature circuit of the motor.

the old fashioned hand starters is eliminated.

The saving of time is just as great as compared to belt shifting, and this operation is never done more often than absolutely necessary, by the operator, and if the belt does not slip sufficiently to ease the machine in starting, high stress both of a mechanical and electrical nature will be imposed.

The ease of starting and stopping the automatically controlled machine causes the operator to stop the apparatus whenever it is not actually in use, thus saving the current required to run the machine while not actually performing work, which is but a very small fraction of the total time.



Ajax forging machine. It has been possible with this machine to substitute direct gear drive, as the controller takes care of any tendency to overload the motor at starting, due to this form of drive. With the belt drive as on the Acme machine, there is, of course, the usual belt slippage enough to allow the machine to get a start.

During the time they have been in

An inspection of this equipment will show the great improvement in appearance and safety by the elimination of the overhead belt and pulley supports due to the fact that direct drive can be safely used. From the electrical standpoint the control is excellent in that it has no shunt regulating coils to burn out, no dash pots to vary in strength and no

tion of the greatest waterway built by man is very evident when you step into the blacksmith shop at Gorgona, Canal Zone. Here you see a shop that has been only a temporary shop and which is to be razed to the ground very shortly. And this shop contains twenty forge fires; eighteen oil furnaces; five steam hammers, ranging from eight hundred

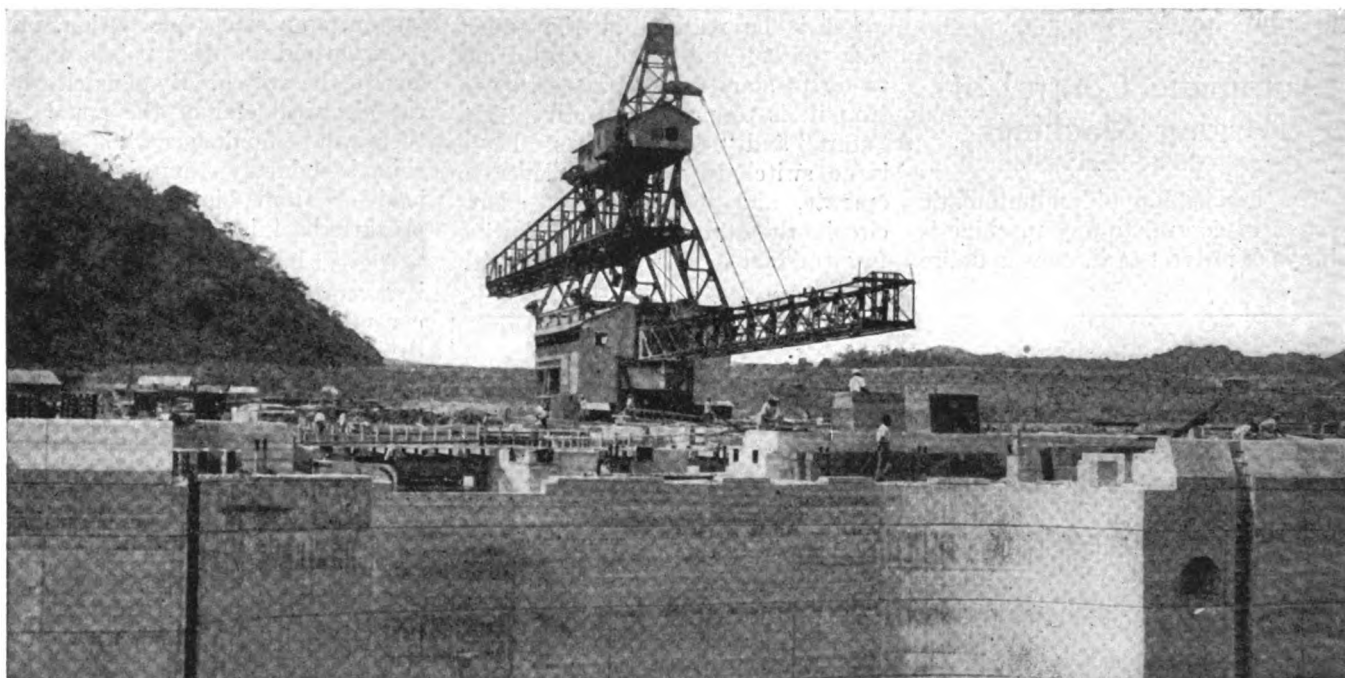


Photo by Paul Thompson

ONE OF THE GREAT CRANES USED IN THE CONSTRUCTION OF THE PANAMA CANAL

service, the automatic controllers have shown no evidence of breakdown or failure, but have, in fact, been entirely unattended so that they cannot be considered complicated or delicate pieces of apparatus.

The ability to place the controlling switch just where it is most handy to the operator, the quickness and surety of starting under all conditions, the freedom from the faults by belt shifting or hand rheostats, the saving of wear and tear on the machine, when running idle and the saving in the operator's time, that may be otherwise usefully employed; all point to automatic control as a great aid to efficient production.

When these benefits are combined with a controlling system, which is in itself rugged and capable of withstanding indefinitely the severest work, we are not far short of ideal control conditions.

There are many sub-points which do not at first become apparent which are again all in favor of automatic control.

sliding contacts to become burned and defective.

The motor is accelerated evenly and smoothly and it is impossible for a dangerous current to exist at any time in the armature during the starting cycle.

The entire attention of the operator can be given to the work to be performed, and he is not distracted by having to perform operations not strictly in line with the work in hand.

The controller can be located at any distance from the machine where it will be entirely out of the way.

Clutch work is greatly diminished and a further saving in wear and tear on the parts of the machine is effected. In fact, the application of automatic control to forging machines may be considered as a great advance in the operation of such apparatus.

The Blacksmith and the Big Ditch

P. A. MORAN

That the humble smith is an important personage in the construc-

tion of the greatest waterway built by man is very evident when you step into the blacksmith shop at Gorgona, Canal Zone. Here you see a shop that has been only a temporary shop and which is to be razed to the ground very shortly. And this shop contains twenty forge fires; eighteen oil furnaces; five steam hammers, ranging from eight hundred

lbs. to five tons; three Bradley hammers for link pin and tool work; one large bulldozer and three large bolt machines. Hustle is the word in this shop. All kinds of work is being done, from the fitting up of the largest wireless station in the world (situated at Colon) to all kinds of car, locomotive, steam shovel and ocean dredge work.

For instance, you will see at one fire a smith making hand-rails for passenger cars. A short distance away you will be interested in the forging of a shaft for one of the large dredges, using a 12 by 12-inch by 12-foot ingot of steel, this forging is heated in one of the large oil furnaces. Almost directly across from this operation you will see the teeth of the large steam shovel buckets being drawn out to cut the dirt and debris in the world-renowned Culebra Cut.

Now take a look at the easy way that slim young smith puts a new end to the huge bucket arm for the steam shovel. It's easy when you



know how. And Uncle Samuel is paying that young smith 85 cents an hour for this work. He certainly earns it in this climate.

Over in the corner we find the spring-man busy, and here we find everything from the bar to the completed locomotive spring ready to be sent to the erecting shop. Here, also, we find one of the important fires—the tool tempering furnace and forge. All sizes of taps, dies, milling cutters, reamers, lathe tools and, in fact, any tool for quick cutting work is sent to this man.

Now just step lively and we will see "Shorty" pull one of his big Thermit welds. So we yell—"Hello, Shorty, what's doing?" "Oh, just a new rim on this big propeller casing for Dredge 83," he returns, "that dirt in the Gatun forebay sure do cut the rims off." This casing is at least nine feet six inches high and the rim in question is around the inner edge. "Shorty" does the Thermit act regularly, and when a locomotive frame gets in bad shape he soon puts it into commission again.

Now we see some bulldozer work pulled off in the form of a 22-inch, forward thrust, 30 by 36-inch cylinder. This is used for quick forming and "rush" work, and "that furnace sure do heat this spot up," to quote an ordinary expression among the workers. Whew! but it's hot! That Bradley hammer is kept very busy, for the great American dump car is a big factor in canal digging.

And as we look at it there goes the big whistle. Do you see that mark about ten feet above the floor? Well, the canal water will cover this spot to that depth when the canal is finished for the passage of boats.

A General Shop of New Zealand

T. O. CHITTENDEN

This is the first letter I have ever written you, and I cannot find words to express how well I like your paper. *It is on its own.* (New Zealand way of putting it.)

The accompanying engraving shows a picture of my shop. The man with the beard is your humble servant, and the man with his arms folded is the wheelwright. We are in a country district and doing a first-class business. We do all kinds of general smithing. You will notice in the picture two giggers which we have

just completed. We use nearly all American goods to work with. American tools have no equal. I have a blower, a shrinker, a bender for tires, drills, dies, etc. The Peter Wright Anvil is one of the best anvils in this district.

I like the differences of opinion expressed in the paper about all sorts of work, but I draw the line at cold tire shrinking. If I had one in my shop it would be put on the scrap heap.

Some of My Experiences with Coal

DAYTON O. SHAW

There is no other thing in the trade which causes as many failures and as many discouragements as poor coal; and a most curious thing in connection with this is the fact that in nine out of every ten cases, something else is blamed instead of the coal; either poor iron, poor steel, or an unskilled workman, will be given as a cause for the failure. I can positively say that I have had more trouble with apprentices, in trying to teach them the importance of good coal, and the necessity of understanding the proper way of arranging their fires for different kinds of work, than any other one thing connected with smithing. Don't lay the charge of cracked steel to the bath, when it was really caused in

but the bath simply exposed the damage which the forge had done, and the direct cause of these cracks is that the blast strikes the steel before the air has been heated to the temperature of the fire. Now, if we are using a coal that clinkers badly, we can readily understand how difficult it is to keep the air from working up through, and reaching the steel, and poor work is the result.

My trouble with coal began some years ago, during the time of a coal famine. I was then employed in a machine shop, and if I had been a new man, my skill would have been very much questioned, but I had been on the job long enough to prove that I could do good work with good material. The new coal arrived just as I had a rush order for some rings; one size was 4 inches wide by $\frac{3}{4}$ inch thick, and 20 inches in diameter; the other size was 5 inches wide, 1 inch thick and 22 inches in diameter. The smaller rings were to be used for skirt-knitting machines, and after they were turned in the machine shop, there were about 800 grooves milled in, $\frac{1}{8}$ of an inch in depth and around the outside, to enable the needle to work in. There would be several grooves just about where the weld came, and consequently the weld must be perfect. The large rings were for clutches made from low carbon steel.



A GENERAL SHOP OF NEW ZEALAND WHERE AMERICAN TOOLS ARE USED

your fire. For instance, we have noticed on the face of a sledge hammer, after it has been hardened, numerous little lines, running from the center close to the edge. These cracks did not originate in the bath,

I placed one of the smaller rings in the fire to weld, and when hot I removed it to the anvil; but it would not weld, and on each side of the lap were pit-holes, $\frac{1}{8}$ inch deep. This was laid aside, to be cut into a smaller



ring. I took another, and upset the ends so as to have something to carry back and forth on, and in spite of the extreme care and every precaution which I used, the job was a failure. I then placed a thin piece of soft iron between the laps, but no weld would result. I was then forced to report the case to the office, and after my explanation, they advised me that they would lose the order for the machines unless they could get those rings, and prevailed upon me to devise some way or means of producing them. I replied, "You get me a ton of charcoal for welding, and although it is pretty hot work,

When taking my vacations I have sometimes visited different shops, and I always noticed that poor coal was the cause of most of the trouble, though an improperly arranged fire is sometimes at fault. I remember of one instance where a young man was endeavoring to weld a bicycle crank. He took a few good heats, but the pieces would slip apart as though they were greased. Of course the man was very much embarrassed, and remarked, "I thought I could weld, but I guess I can't." I asked—"What do you think is the trouble?" "It must be me," he replied, "don't you think so?" I replied: "That

am more than pleased with the way it works. I find it superior to anything I have used for steel work, and I don't believe a man makes any mistake when he buys this coal.

Which Way Do the Gears Turn

The accompanying engravings show several views of the Spiro Turbine. Fig. 1 shows the two gear wheels mounted on their bearings, while Fig. 2 shows the base without the gear wheels or rotors. This latter view also shows one of the steam ports. There are two ports in this

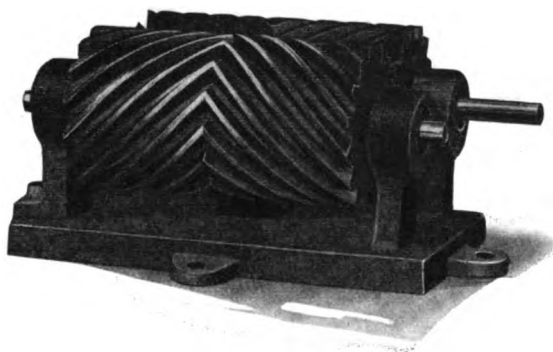


FIG. 1—WHICH WAY DO THE GEARS TURN? THE STEAM ENTERS AT THE BOTTOM AND EXHAUSTS ABOVE

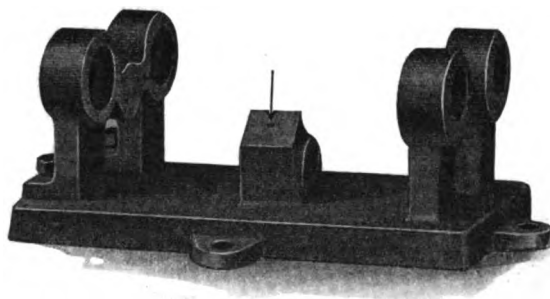


FIG. 2—THIS IS THE BASE UPON WHICH THE GEARS RUN. THE ARROW POINTS TO THE STEAM PORT

making a ring of that size in a charcoal fire, it is the only solution to the problem." The next coal I received was a shade better, and by getting my ring ready to weld, and by making a new fire, I could make just one weld, and would be obliged to build a new fire for the next.

For a number of years I used a coal which when used for a new fire was muddy and sticky, and we were obliged to spend some time in burning and drying this undesirable part off. Before putting in steel work, I sometimes mixed in charcoal to insure good results.

I inquired of a salesman the reason why we could not get better coal, and he replied, "Because it is not mined. The veins of the old coal which you have used have run out."

I was dressing over an ax for a Frenchman one day, and threw some charcoal into the fire to soften it up. Upon noticing what I did, he immediately inquired, "Do you use charcoal for axes? my father used hemlock bark, and he could do a good job." I have also used the same fuel for sharpening blast drills, when away back in the country.

depends on how far your skill enters into the work. No one could take a better heat or handle the work on the anvil more skillfully than you. Now, if your skill goes beyond that, it must rest with you." "What do you mean?" he inquired, and I then told him that his coal was poor, and unfit for welding steel to good advantage. I also endeavored to show him how to burn and coke up his fire. He then worked the laps over a little, took a heat, and it welded nicely. He was extremely grateful for the information.

It is certainly embarrassing and discouraging, to have a customer gazing on the scene while you are obliged to try two or three times to make a weld, and then have them tell you how some old smith could weld it the first time. If you should tell them it was the fault of the coal, they would simply laugh and treat it as a joke; so we work on, and try to make up the deficiency by the liberal use of welding compounds.

Good coal is cheap at any price. It will save a man's reputation, and it may save a confession also. I am using Webster Smithing Coal, and

central rib; one on each side of the point. The steam enters this central rib and is forced out of the ports on each side of the point, impinging on the rotors. The steam is exhausted at the top of the rotors.

Naturally it would be supposed that the steam entering at the bottom and in order to turn the rotors must needs pass between the rotors in getting to the exhaust. This, however, is not so. The X-ray view of the turbine will give a better idea of its operation. When leaving the ports the steam passes around the rotors on the outside; thus causing them to turn away from each other at the bottom and toward each other at the top. The steam then reaches the exhaust after its power is almost completely utilized.

An Improved Oxy-Acetylene Welding Plant—4

ALBERT H. WAYCHOFF
How to Weld

The principle of oxy-acetylene welding, or autogenous-welding, as its name implies, is a fusion of the metals by heat, thus making them as solid



as when one piece. This is accomplished by what is known as a feeder—a wire or rod of the same kind of metal as the article that is being welded. For instance; if you are welding cast iron you use a cast-iron rod; for steel, steel wire, etc. In other words you must use a feeder having the same fusing or melting point as the article being welded.

The efficiency of an oxy-acetylene weld depends on the skill of the operator, entirely, and the care he uses in doing the work. In using the torch the most preferable way is for the operator to work towards himself rather than away from himself. When the operator is working away from himself the flame of the torch is at an angle of about sixty degrees, and the flame is directed towards the unwelded portion of the work. In this position the force of the flame will crowd some of the melted metal out on the colder part of the work, which becomes chilled too suddenly to unite firmly with the metal in the article being welded, and this makes it very difficult, in fact almost impossible, to make a solid, firm weld

the flame strikes the sloping part of the weld almost perpendicularly and has less of a tendency to displace the molten metal. In all cases where it is possible the torch itself should be held at an angle of about sixty degrees and the head or nozzle should be at a side angle of about one hundred and twenty.

To prepare any ordinary work for welding, say for instance, a piece of flat cast iron or any metal, or a casting such as an engine cylinder or crank case, the first thing to do is to cut a V-shaped groove along the line of the crack or break where the weld is to be made; cutting nearly to the bottom of or nearly through the article to be welded. The operator should have several diamond point chisels for this purpose.

In cutting this groove, which among oxy-acetylene welding operators is known as the V, care should be taken so as not to cut clear through. A hole through allows the melted metal to run through, and at the same time the flame from the torch will melt it more; causing it to become larger.

or gasoline torch such as is used for brazing. The idea in preheating is to save gases and also on heavy work it makes a more satisfactory weld. In adjusting the flame of the torch for cast iron it must have a brilliant, clean edge, a white, conical-shaped flame in the center and right at the tip. This cone should be surrounded by a clear bluish flame. If the flame appears ragged or uneven it shows an excess of acetylene gas and is not satisfactory for cast iron. All other metals require an entirely different flame, having a slight excess of acetylene, making the white flame in the center of a ragged or rough appearance.

If the flame smokes or deposits any soot it is because there is too much acetylene being used to properly mix with the oxygen. In this case the acetylene must be turned off a little or a little more oxygen turned on.

Instead of welding in the bottom of the V-groove for a short distance and then forming a pool of molten metal of the required depth above it, as is the method employed by a number of operators, I believe the best way is to add constantly very small portions of the filling wire or rods, or feeders as they are generally called, to the advancing surface of molten metal in the groove. If the operator works towards himself this method is very easy. In this way the sides and bottom of the V-groove become melted by the time the weld reaches them, and the filling rod or feeder can be added to the small area of melted metal in a more uniform way.

be added to the small area of melted metal in a more uniform way.

be added to the small area of melted metal in a more uniform way.

To help keep the melted metal in place, the article should be, if possible, inclined upward in the direction in which the weld is advancing; an inch to the

foot being sufficient in most cases.

Instead of keeping the flame in contact with the melted metal all the time it is best to increase the distance as the metal melts. Of course if it is removed too far the metal will not melt fast enough, and in case the metal melts too slow the work is

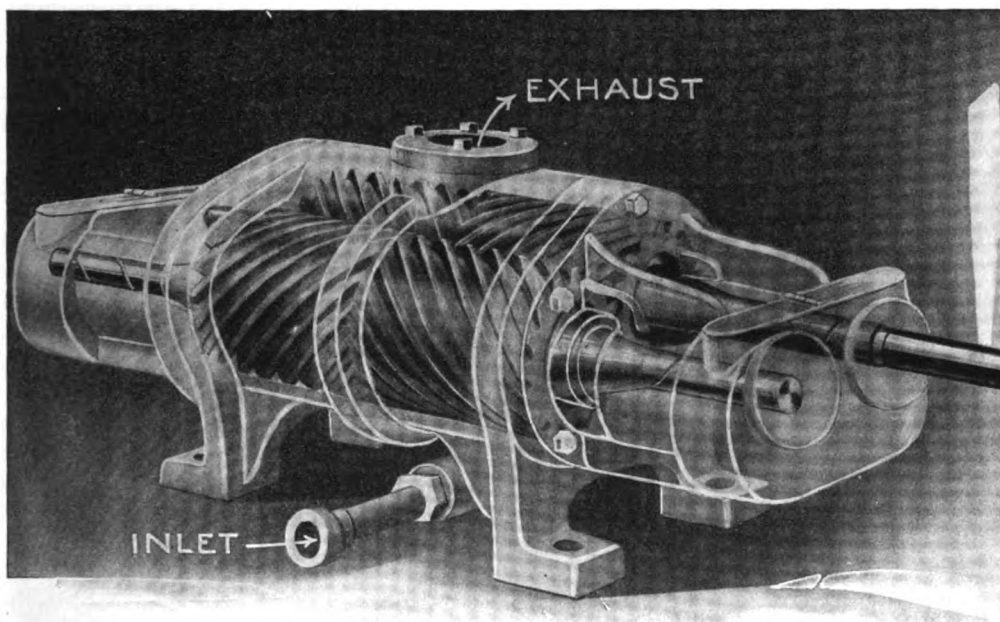


FIG. 3—X-RAY VIEW OF THE TURBINE. STEAM ENTERS UNDERNEATH, AS INDICATED, AND EXHAUSTS AT THE TOP

or to build up the metal to a proper thickness. But if the work be directed toward the operator with the torch held at an angle of about sixty degrees, while the head of the torch is tilted at an angle of sixty to one hundred and twenty degrees, with the finished part of the weld,

A welding flux for metals must be used for all metals with the exception of some grades of steel.

The article to be welded should be laid on the welding table or put in other convenient position, and if a heavy article it should be preheated. The preheating is done with a gas



not satisfactory. So the proper way to give the most satisfactory results is to keep the flame in contact with the metal while it is cold and then gradually withdraw it as far as possible and still do satisfactory and rapid work.

Various trials and experiments show that the modified ways of doing the work is a great help in making welds.

it would burn, indefinitely, as long as the gases were supplied.

Most operators when a back fire occurs turn off the gases and then wait a minute or two, then turn on the gases, light the flame and then adjust it, the whole operation requiring nearly five minutes, which allows the work to cool down to a dull red or even black color.

chisel and cut the V-groove all along the crack and a half or quarter inch past at each end.

This V-groove should be cut nearly but not quite through the metal.

Then take a feeder for cast iron, which should be a cast-iron rod about three sixteenths inch in diameter and of proper length so as not to get the hands too close to the fire, adjust the flame of the torch for cast iron as explained at the head of this article and you are ready to commence work. Use plenty of welding flux or scaling powder. Turn the flame in the groove and when heated to a molten state to about one quarter of the thickness of the metal apply the feeder, and gradually fill up the groove, as previously explained. When the groove is filled up allow the cylinder to cool as slowly as possible and keep it from air drafts, etc., as too sudden cooling sometimes causes the weld to pull apart or weaken, especially on a cylindrical or similar shaped article.

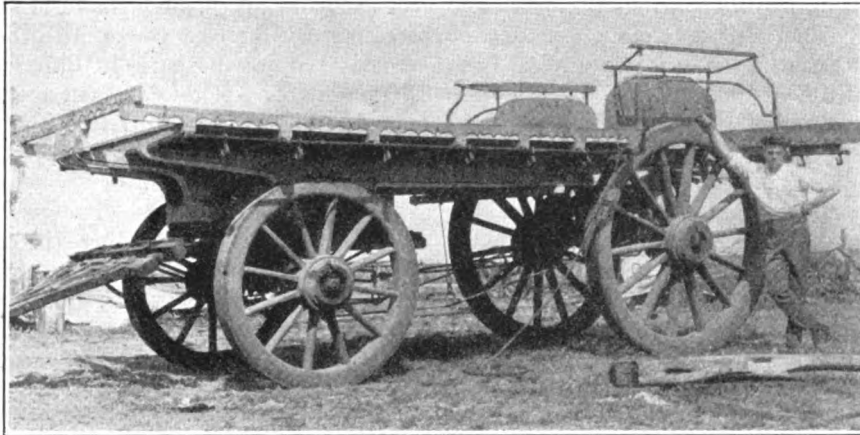
In doing work on cylinders or other articles where there are machined parts or threads they should be coated with a mixture of graphite and heavy lubricating oil to protect them from the heat.

This gives the procedure for doing cast iron, which is alike, practically in all cases.

For steel or wrought iron the method is the same, excepting that instead of a cast-iron feeder a steel rod should be used and no welding flux or scaling powder is necessary. However, if the steel is very rusty it must be cleaned with a stiff wire brush or something similar. The flame for steel must be different than that for cast iron; using more acetylene, which makes a ragged white center flame.

Brass, copper and bronze should be the same kind of flame as for steel, and the feeders should be made of either brass or copper; for these metals the amount of force of the flame can be greatly reduced, but at the same time they must have the excess of acetylene to make the blaze rather ragged.

Aluminum is the pitfall into which all operators fall. It is the hardest of the metals to learn to weld, but after an operator gets so he can handle it it is really the easiest to work. As with other metals the first



A LARGE AUSTRALIAN WAGON MADE BY MR. H. B. SMITH OF QUEENSLAND

In some cases after the work has been started and the metal well heated the flame may be removed for a considerable distance from the work without affecting the quality of the weld, or the rapidity of the work.

In increasing the distance between the flame and the work, the torch is thus kept farther from the hot metal, which gives a more constant flame. This does away with the frequent cooling of the torch in water, which must be done if the flame and torch are kept too close to the melted metal. Also the greater distance the flame and the head of the torch can be kept from the work while the metal is in the molten state the less "back fires" there will be.

These "back fires" are small, harmless explosions inside the head of the torch. While they cause no serious trouble they are very annoying to operators as they tend to make the fire uneven.

These back fires are principally caused by a temporary reduction of the velocity of the gases, usually by some obstruction in the opening of the nozzle; as when the nozzle is passed too close to the work it causes the velocity of the gases to be lowered and the fire passes through the small opening in the nozzle and up into the mixing chamber. There

A more satisfactory way which I have successfully used for some time is to have a piece of leather handy on the welding table, and in case of a back fire simply press the nozzle or tip on this for an instant and then turn it back on the work. The work being still white hot lights the gas, and practically no time at all is lost. Besides, an interrupted weld is not satisfactory.

A great many operators try hammering or tapping a weld, which is a very bad practice, always doing more harm than good. Where they get this idea I cannot say, but if possible an article to be welded should be blocked or clamped so it cannot move till cool.

A preheating outfit is not exactly a necessity, but it is advisable to have one. It makes a great saving in the costs of doing the work, also a considerable saving in time, especially on heavy work.

All the various kinds of work are done practically alike, yet there is some slight difference, so I will take up the various metals singly.

Welding Cast Iron

In welding a broken piece of cast iron we will take as an illustration an engine cylinder. The first thing to do if the cylinder is merely cracked is to take a sharp diamond point



thing to do is to cut out the V-groove. On thin castings cut it about two thirds of the thickness of the casting, while on the heavier ones it should be within about one fourth of an inch of cutting through. If the piece is very large or complicated it must be preheated some, as an aluminum casting breaks very easily. The unequal heating, if the casting were not preheated, would in all probability cause it to crack from the uneven expansion. It should gradually be brought to a heat which would turn small shavings or sawdust a brownish color.

Then take an aluminum welding rod or feeder and file the point off to a flat shape, similar to a screw-driver point, and round off the corners. Heat this rod till when it is dipped into the flux some will stick to it, then start in heating the groove and the rod together and puddle the groove full.

Fill the groove carefully, smooth it over and then allow the casting to cool slowly.

With aluminum it is necessary to practice considerably till you catch the knack of it, then you will find it a very easy metal to handle.

With all the metals if they are completely broken apart the best way is to clamp them securely together and then cut the V-groove and proceed the same as for welding where an article is simply cracked.

For lead, the oxy-acetylene process is hardly a success, although I have done some fairly good work with the acetylene flame.

For thin sheet metals, such as tanks, containers, etc., the metals are simply placed with the two edges together and welded the same way as the heavier metals are, without the V-groove. The proper pressure for the acetylene is from five pounds per square inch in welding thin metals of one thirty-second of an inch in thickness to fifteen pounds for heaviest work; the oxygen pressure ranges from ten to thirty pounds.

In welding sheet metal, probably the best way is to bend two angles, and then setting these two as closely together as possible fuse the two ends together at intervals of about six inches. Then go all along the seam, fusing the edges together, filling in any low or hollow places with the welding rod. A great many operators have trouble with hard and

burned spots in their welds. The beginner usually gets into this trouble first thing, and on steel shafting and other work where they have to be machined after welding these spots cause no end of trouble. Even experienced operators who have handled machines for some time have this trouble. I have it myself, and yet I believe that with the proper consideration and care it is entirely unnecessary. In the first place the operator must consider these things: first, the weld, especially on heavy work if it hasn't been preheated, is in some places slower to heat, owing to radiation or other causes, and that the feeding or filling-in metal reaches it while it is at a much lower temperature; thus causing a sort of a different spot than where the metal which is being added and the casting or other article are both at the proper heat.

Also, the oxygen which is fed to the torch must be kept to a minimum. If there is too much oxygen in the flame it tends to oxidize or burn the work. This is practically the same principle on which the cutting torch operates. The operator should be provided with a good pair of smoked glasses or goggles, and the cone flame, or flame cone, whichever you might call it, must be sharply defined. Another cause of hard spots in welds is, no doubt, in keeping the torch too long in one spot.

(To be continued)

EDITOR'S NOTE—Mr. Waychoff's series of articles on the building and the operation of an oxy-acetylene welding and cutting plant began in the July issue. His next installment will have to do with the actual operation of a welding shop and the making of some of the items of equipment.

A Big Australian Wagon

H. B. SMITH

The accompanying photograph shows a wagon which I have built for an oil tractor. The dimensions of it are as follows: Length, 21 feet 6 inches; width, 8 feet 6 inches; rear wheels, 6 feet 2 inches; front wheels, 4 feet 8 inches; tires, 6 inches by 1 inch; axles, 3½ inches.

I do smithing and woodworking here in Queensland, but very little shoeing. Have a five-horsepower Tangye oil engine; an automatic lathe; drilling machines; grinder, and a large variety of other tools.

I do motor and engine-repairing, and anything else that comes along.



The Editor Talks About Prices for Auto-Work

"What do you find—" began Benton, "to be the biggest trouble of the general smith, in taking hold and doing auto-work?"

"Price is the biggest stumbling block," returned the Editor. "If the general smith could get away from the old idea of charging for work on the basis of materials used, he would begin to get some fair return for his work."

"I heard of an actual case, the other day, that illustrates just exactly what I mean. Several members of a prominent Wisconsin firm of automobile manufacturers were touring through Indiana, when a steering rod and knuckle broke. They were not near any service branch of their company, and were considering the necessity of waiting over Sunday (the accident occurred on Saturday), until a new part could be shipped to them."

"Finally a country boy, coming along the road and observing their trouble, said: 'I believe that our blacksmith, back in town, can fix that for you.' None of the party, however, were inclined to consider the suggestion seriously, but after some discussion, they decided to interview the blacksmith. 'It won't place us in any worse plight, and he may be able to help us out,' said one of the party."

"So they explained their difficulty to the smith, when they reached his shop, and asked him if he had ever repaired anything like it before. He candidly admitted that he had not, but said he was sure he could do a good job; and in a few hours the smith made good his word. He had the machine in good running order, very much to the surprise and gratification of the entire party."

"When everything was again in good order, the owner of the automobile asked the smith how much the bill was. After a little hesitation and a glance at the car, the smith said: 'Oh, I guess seventy-five cents will cover it.' The surprise of the entire party can hardly be imagined. They would, of course, have been glad to have paid five or six dollars for the work, and have considered themselves lucky. But seventy-five cents was all the smith asked."

"That, I think, illustrates more than anything else, where the smith falls down on this automobile repair proposition. A good, practical general smith can do automobile repairing better, more workmanlike, and is better equipped, than most so-called experts. The only thing the smith seems to fail on, is the matter of price. I think if the smith will make his prices on the basis of what the work is worth to the autoist, he will come nearer getting what he should for auto-work."



Jus' Foolin' 'Round

(With Apologies to Walt Mason)

Old Weldem, the blacksmith, has gone to the dump, and people who knew him, say he was a chump. His prospects were fine, when he opened his doors, and customers came with their trade by the scores. They came with their welding, their woodwork, and nags. They brought in their rigs, scythes, boots, and oat bags. But soon they went elsewhere to blow in their dough, for Weldem turned out just a foolish old crow—while others were getting long green by the pound, Old Weldem, the blacksmith, was jus' foolin' 'round.

He stood in the alley, and ranted and tore, debating the tariff, with some one next door; he roasted the tariff, on hash, ham and stew, while customers waited with horses to shoe. He argued that Congress is out for the pelf, and left his fine smithy to wait on itself. And patrons got huffy, their back teeth they ground, while Weldem, the blacksmith, was jus' foolin' 'round.

Old Weldem would talk of the sporting "profesh," and reel off their records, while people who'd thresh, were wishing he'd fix their machines with despatch, and cut out his yarns, which were starting to hatch. He'd talk about Sullivan, Jeffries, or Gotch, for forty-five minutes or more, by the watch, while customers jingled their coin in his shop, and waited, and sweated, 'till ready to drop. At last they'd hurry down street with a bound, while Weldem, the blacksmith, was jus' foolin' 'round.

The smith who would win in these strenuous days, must 'tend to his business in fifty-six ways—be eager and hustling,—with vim be athrob—his mind not afield, but right on the job. The sheriff soon comes, with his horse and his hound, to talk to the man who keeps jus' foolin' 'round.



Some folks are prouder of their theoreics than they are of their results.

It is well and good to have Ideals, and to live up to them, but—be sure your Ideals are liberally sprinkled with you-deals.

Which do you think most important?—What you think of yourself, or what people think of you? Think it over.

It is hard to lose trade, when a man makes real, conscientious effort to build it up—in fact, it's almost impossible.

Right thinking and right working are a combination that will make success stare you in the face.

"Queer, isn't it?" says Sam Hill, "how much forging smiths do, and yet when it

comes to forging ahead, lots of smiths can't do the job."

How about the auto in your section? Any reason why you cannot take up the work? Any reason why you cannot put a little more profit in your pocket?

There's a difference in building a wagon for one customer and simply resetting a shoe for another—but, there should be no difference in the courtesy extended to each.

"The social approval of an individual's labor is of considerable weight," says the psychologist. True—true—and especially so before payment has been made for the labor.

Spread a few smiles at home—don't save all your jokes and stories for lodge or shop. A smile in the shop is worth money, but a smile in the home is worth more than money. Try it, and see.

You don't take much stock in the chap who knocks the man he's working for—then why knock the craft that enables you to feed and clothe your family? Don't knock! boost—you'll find it pays better.

Which question decides your purchases? "Is it cheap?" or "Can I sell it before the interest on the money eats up the profit?" Your answers decide whether you are doing business on the right basis or not.

Does the appearance of your shop tend to increase or decrease your business? Think about this, it's important. Go out and look at your shop, from a stranger's viewpoint; and when you've done that, do the same with yourself.

Heard from your herd, have they? Better ask for a new lot of Pink Buffaloes if your supply is low. Don't wait until you are entirely out. We've got lots of them—use them freely, ask for them freely, we give them freely.

Right now, on the eve of the closed-window-and-door season, is a good time to treat the shop walls to a coat of white-wash. Try it, and see how much brighter and more cheerful seem the shop and the work.

The end of the year is the time to get that running start on next year. Now is the time to start. Don't wait until New Year's. Get right into pushing for new business now. Start now, to ward off that mid-winter dullness.

What do you do?—Guess at profits, or simply not care, so long as you get your money? Some smiths seem to feel that their real purpose in business is to get the price that their competitor was going to charge—or even a little less—irrespective of cost.

No opportunities, you say. Perhaps you're not ready to grasp them. Ever think of that? The chap who brings in the most runs, is the fellow who's "there with the bang," when the ball comes right for him. But—he's got to see it, when it does come.

What—asks someone—is the object of the Booster's League? Simply what its name implies—a league of loyal craftsmen, who boost for the craft—who give the lie to the knocker—who are not afraid to stand up and say—"I'm a smith." Are you a member of the Booster's League?

"When a man buys a cheap article, he feels good when he pays for it, and then feels rotten when he is using it. But when he buys a quality article, he feels good every time he uses it, and he thinks about the quality long after he forgets about the price." From "Pete Crowther"—(a new book).

Things in general will go on just the same after election—so "keep-a-hammerin'". Don't let the bug-a-boo of forecasted disaster, and the vaporous cloud of the calamity howler, disturb you. "Keep right at it, early, late—hammerin' shoes, or a garden gate—don't upon black clouds await, but—keep-a-hammerin'."

Shut your eyes, and think hard, when you get to looking pessimistically at the trade. Think ten, twenty years ahead—think what has been done in the past five years; and then—with the searchlight of the future to guide you—get busy, and stay busy, and you'll be right up with the van of the craft every step of the way.

Yes, the anvil and the hammer are practically the same as they were centuries ago. But, what about other smith-shop equipment? Modern tools and machines are making smithing easier. Electricity and gasoline are helping, these days. Are you using modern tools? Better switch from granddaddy's tools before you're a granddaddy.

When asked if he figured a certain proportion of rent, salary, interest on investment, and such items, into each price he asked, Friend Tardy replied: "Why, no—you fellers must think I'm crazy. If I figured that there way, my prices would be so high I wouldn't do no business a'tall. No sir—ee—all I want is fair pay for the work." Wonder how long before Tom wakes up?

The Editor of a prominent advertising journal says, apropos of the decision of the American Locomotive Company to discontinue its auto-truck business, that but three concerns have "really and truly" made any money out of truck manufacture. There has been and still is so much "bull and hot air" about the "wonderful(?)" possibilities of the auto-truck, that it is refreshing to get hold of something that comes across with at least all the appearance of true fact.

A New Binder is now awaiting your orders. This binder is the new Dowst Binder—no punching of holes, no strings, nothing to do but put your copies in the covers of the binder—steel rods and steel posts hold the papers tightly. The price is \$1.50, postpaid. The name, THE AMERICAN BLACKSMITH, appears in gold, on the front cover; and the inside back cover is an index and memorandum blank. "Best binder I ever saw," is what most folks say when they see it.

A Chicago woman says: "I thoroughly believe that one cannot save successfully, unless by putting away a certain sum regularly. Some days ago I had a bill to meet, that I paid on the installment plan. It was at the suggestion of my creditor that I followed this plan of payment. It not only helped me to pay the debt easily, but it taught me that I could do without a great many things that I might have bought had I the funds." Adopt some system, TODAY, of saving a certain percentage of your income.

This little jingle from an exchange, seems to us, expresses about the right idea, when it comes to finding fault with others:

I'd criticise the other chap,
And pan him good and strong;
I'd pick my neighbor, Jones, to bits,
And show folks where he's wrong.

I'd wollop Smith, and jump on Brown—
They needn't put on airs—
But, I'm so blamed busy with my own faults,
I haven't time for theirs!



Our Honor Roll

One in Every Four.

Of the new names added to Our Honor Roll this month, one in every four is located in a country other than the United States or its possessions—in either Africa, England or Australia.

And again we have found it necessary to curtail our list by removing the names of those subscribers whose subscriptions expire with August, 1916. So when you get on this list, get up near the head. If your subscription expires this month, better take out a ten-year subscription—it will save you money, time and trouble, and put you right up near the leaders.

U. S. and Mexico	Canada	Other Countries
2 yrs. \$1.60 save \$.40	2.00 save \$.50	10 sh. save 2 sh.
3 yrs. 2.00 save 1.00	2.70 save 1.05	14 sh. save 4 sh.
4 yrs. 2.50 save 1.50	3.20 save 1.80	18 sh. save 6 sh.
5 yrs. 3.00 save 2.00	3.75 save 2.50	1 £ save 10 sh.
10 yrs. 5.00 save 5.00	7.00 save 5.50	1 £ 14 sh. save 1 £ 6 sh.

Send your order and remittance now—today. Don't wait until you forget all about it. You'll never regret it. Our subscription insurance saves you money. The sooner you begin saving the more you save. There is no time better than NOW.

NAME	Subscription Paid to	NAME	Subscription Paid to
W. C. WATT, Kan.	Dec., 1930	A. B. WENDLANDT, Wash.	Sept., 1918
WADDINGTON FARM, W. Va.	Mar., 1928	A. J. BROOKMAN & Co., Vic.	Sept., 1918
I. J. STITES, N. J.	Jan., 1928	PETER COCKS, W. Aus.	Sept., 1918
J. BAILEY, Man.	Dec., 1923	R. J. TOMPKINS, Texas	Sept., 1918
W. R. TURNER, Man.	Oct., 1923	L. SMITH, Cal.	Aug., 1918
C. NELSON, Neb.	Sept., 1923	W. CRIBB, Queensland	Aug., 1918
O. W. TAYLOR, Pa.	Aug., 1923	G. B. REID, S. Africa	Aug., 1918
S. EYFENAAER, S. Africa	July, 1923	H. KELENBENZ, N. J.	Aug., 1918
G. L. DEWITT, Mont.	July, 1923	W. D. BRADFORD, Cal.	Aug., 1918
W. B. BRIGGS, Tex.	July, 1923	A. DISCHER, Aus.	Aug., 1918
O. C. YOUNG, Mich.	June, 1923	GILBERT BROS., S. Aus.	July, 1918
OTTO SIPPFL, Penn.	June, 1923	A. MACKENZIE, W. Aus.	July, 1918
A. CHAPMAN, N. Y.	June, 1923	GEO. DASH, N. Zealand	July, 1918
C. BIRLEY, Md.	June, 1923	C. R. OLIVER, S. Africa	July, 1918
F. H. SHUPF, Penn.	June, 1923	L. G. REID, S. Africa	July, 1918
J. C. STOVER, Penn.	Apr., 1923	W. M. PURYEAR, Ala.	June, 1918
W. SCROONOVER, Penn.	Apr., 1923	THOM & VERSTEE, S. Africa	June, 1918
LOWNDALE BROS., Mo.	Mar., 1923	L. LACASTE, Que.	June, 1918
J. CARSWELL, Ark.	Mar., 1923	WRIGHT & SON, Texas	June, 1918
G. E. GLAZIER, Ohio	Mar., 1923	ALBERT MELLUM, N. D.	June, 1918
T. BRADLEY, N. S. Wales	Mar., 1923	J. LINDSAY, S. Africa	June, 1918
I. T. NEEDHAM, Ill.	Feb., 1923	J. H. GIBBS, S. Africa	June, 1918
G. C. DISINGER, Miss.	Feb., 1923	W. W. BRIDGES, Ark.	June, 1918
J. HUGHES, Ohio	Feb., 1923	ED. HOLLAND, Queens.	May, 1918
J. WIEBER, Minn.	Jan., 1923	H. L. HASWELL, N. C.	May, 1918
Z. A. ENOS, Kan.	Jan., 1923	E. KOEPKE, Wis.	Apr., 1918
W. G. WISE, Cal.	Jan., 1923	J. H. MARTIN MFG. CO., Ind.	Apr., 1918
F. S. BISHOP, S. Africa	Jan., 1923	H. S. WAYNE, S. Aus.	Apr., 1918
S. P. HARNBY, Mont.	Dec., 1922	H. S. YONGUE, Wash.	Apr., 1918
W. BRECKNER, Okla.	Dec., 1922	W. WELHAUSEN, N. D.	Apr., 1918
J. PABIAN, Neb.	Dec., 1922	W. H. CHIPMAN, Mo.	Apr., 1918
P. FREDERICKSEN, Iowa	Nov., 1922	A. P. STROBEL, N. Y.	Apr., 1918
L. O. LEIURS, Ill.	Nov., 1922	E. H. ALBERTY, Pa.	Apr., 1918
W. LAWSON, N. Z.	Nov., 1922	J. R. JEFFRIES, Pa.	Apr., 1918
W. H. MILLER, Iowa	Oct., 1922	R. COLVIN, Ind.	Apr., 1918
A. O. MARTIN, Idaho	Sept., 1922	J. LIPPERT, Ill.	Apr., 1918
O. A. MORTIMORE, Idaho	Sept., 1922	OTTO TIETZ, S. Africa	Apr., 1918
H. J. WYATT, Wash.	Sept., 1922	J. V. FISH, Ill.	Mar., 1918
J. N. SKOW, Iowa	Sept., 1922	H. J. FISHER, Mich.	Mar., 1918
A. D. STANDFORD, Wash.	Sept., 1922	GEO. SMITH, N. Z.	Mar., 1918
T. TEMKIEWICZ, Que.	Sept., 1922	Aug. HOLZENAGEL, Ore.	Mar., 1918
A. PFYFFER, Ohio	Aug., 1922	A. E. UEBLING, Wis.	Mar., 1918
W. D. VALENTINE, Iowa	Aug., 1922	P. J. THORNEYCRIST, N. W. T.	Mar., 1918
G. HOFFMAN, N. Y.	July, 1922	J. C. YOUNG, Pa.	Mar., 1918
J. ERMAN, Ark.	July, 1922	D. C. HOUCK, Ohio	Mar., 1918
W. K. W. HANSEN, Pa.	June, 1922	JOHN EYRE, Neb.	Mar., 1918
ROBERT TOCHTER, Cal.	June, 1922	S. J. BOYD, Idaho	Feb., 1918
J. VAN MARTER, N. Y.	June, 1922	F. J. MOLITOR, Ill.	Feb., 1918
E. ANDERS & SON, S. Aus.	May, 1922	F. P. FELLOWS, N. Y.	Feb., 1918
LOUISA CARRIAGE WKS., Va.	May, 1922	J. W. STEADMAN, Ohio	Feb., 1918
S. SMITH, Tex.	Apr., 1922	J. P. HOLLAFFEL, Penn.	Feb., 1918
J. W. HAAR, La.	Mar., 1922	E. N. GATES, Vic., Aus.	Feb., 1918
E. A. DILLON, Nev.	Mar., 1922	RENTON WAGON WKS., Wash.	Feb., 1918
D. F. SMITH, R. I.	Mar., 1922	WHITING FTY. EQUIP. CO., Ill.	Feb., 1918
D. F. KUSTER, Wash.	Mar., 1922	J. P. KOENIGS, S. Dak.	Feb., 1918
G. F. JOHNSON, Mich.	Feb., 1922	RICHARD BRENNER, Tex.	Feb., 1918
R. H. KEITH, Iowa	Jan., 1922	W. F. HILL, N. C.	Feb., 1918
O. M. JOHNSON, Minn.	Oct., 1921	J. B. BETTEL, Me.	Jan., 1918
H. FELDUS, Neb.	Sept., 1921	W. MISCALE, Queen, Aus.	Jan., 1918
W. K. KLINE, Kan.	May, 1921	S. PORTELANCE, Que.	Jan., 1918
J. L. JESTER, Mo.	Jan., 1921	D. C. FOLEY, Cal.	Jan., 1918
R. S. CRISLER, Ky.	Jan., 1920	GLEASON BROS., La.	Jan., 1918
ED. GRIMM, Tex.	Mar., 1920	C. E. KRUG, Wis.	Jan., 1918
T. P. CONODINE, Mass.	Dec., 1920	G. E. WOODARD, Kan.	Jan., 1918
J. NAIMITH, N. Zealand	Nov., 1919	P. J. DALLY, W. Aus.	Jan., 1918
F. UNDERWOOD, S. Africa	Aug., 1919	J. MORROW, Pa.	Jan., 1918
THEO. PASCHKE, Neb.	Apr., 1919	J. TEMPLETON, Scotland	Dec., 1917
I. M. TOWNSEND, Cal.	Apr., 1919	F. PROCTER, Tas.	Dec., 1917
G. BISH, Fiji Islands	Apr., 1919	J. G. JOHNSON, Ill.	Dec., 1917
C. WILLIAMS, W. Aus.	Mar., 1919	F. E. FGLERS, Ohio	Dec., 1917
R. TAYLOR, N. Zealand	Feb., 1919	C. T. FORREST, Cal.	Dec., 1917
GEO. A. PETTY, Utah	Sept., 1918	THEO. BUSH, N. Y.	Dec., 1917
G. W. HAZLETT, Pa.	Sept., 1918	J. T. ELLIOTT, Ill.	Dec., 1917
C. WALTER, Ore.	Sept., 1918		
T. B. HOLT, Okla.	Sept., 1918		
ROBERT COOK, Ky.	Sept., 1918		

NAME	Subscription Paid to	NAME	Subscription Paid to
J. VOELPEL, Ill.	Dec., 1917	J. H. HOYLE, S. Africa	Feb., 1917
W. J. MAIN, Cal.	Dec., 1917	F. ROSCHY, Pa.	Feb., 1917
G. J. SAUER, Mo.	Dec., 1917	AUGUST MILLER, Ill.	Feb., 1917
MESS BROS., Victoria	Dec., 1917	C. P. ROBERTSON, S. Africa	Feb., 1917
E. BLOOMER, Aus.	Dec., 1917	O. DAMNEMAN, Minn.	Jan., 1917
H. P. ADAMSON, N. Zealand	Dec., 1917	S. HETEM, S. Africa	Jan., 1917
McMILLAN, HEAD & Co., S. Africa	Nov., 1917	G. A. GURLEY, Ore.	Jan., 1917
C. ANDERSEN, Queens	Nov., 1917	F. K. WADE, Me.	Jan., 1917
J. KILGOUR, Scotland	Nov., 1917	L. V. SENN, Neb.	Jan., 1917
F. R. TOMLINSON, Kan.	Nov., 1917	S. H. AUSTIN, N. Y.	Jan., 1917
KAYE & AINLEY, Eng.	Nov., 1917	H. KAHN, Ia.	Jan., 1917
T. H. ZIEGELER, Wis.	Nov., 1917	J. H. BERGEN, Kan.	Jan., 1917
SCHOLLER BROS., Ind.	Nov., 1917	F. G. A. WILLIAMS, S. Aus.	Jan., 1917
E. M. WURSTER, Mich.	Nov., 1917	E. E. TRENE, Pa.	Dec., 1916
S. Z. FREY, Ind.	Nov., 1917	B. S. CASEY, Mass.	Dec., 1916
B. A. STEINKE, Ohio	Nov., 1917	W. DENSER, Mo.	Dec., 1916
J. N. BATHGATE, N. Dak.	Nov., 1917	J. B. SCHEIDLER, Ind.	Dec., 1916
W. H. HOUGHTON, Pa.	Nov., 1917	F. KUMMER, Ohio	Dec., 1916
S. SMITH, S. Aus.	Oct., 1917	ALFRED CASE, N. Z.	Dec., 1916
W. STEPHEN, Queens	Oct., 1917	H. GRIMM, Utah	Dec., 1916
W. T. CUTKOMP, Iowa	Oct., 1917	A. H. GOODING, S. Aus.	Dec., 1916
J. DELAUS, Neb.	Oct., 1917	LEONARD SMITH, N. J.	Dec., 1916
GEO. POTSCHKE, Mo.	Oct., 1917	C. F. SHAW, Man.	Dec., 1916
J. W. RAPS, N. Y.	Oct., 1917	W. EDWARD, Pa.	Dec., 1916
W. C. RONEY, Pa.	Oct., 1917	W. W. EOLY, Pa.	Dec., 1916
J. N. MILES, Ky.	Oct., 1917	JOS. BOYER, Mich.	Dec., 1916
EMIL PLATE, N. D.	Sept., 1917	J. WILLIAMS, N. S. Wales	Dec., 1916
F. STAUB, Ohio	Sept., 1917	J. H. W. SCHNEIDER, Cal.	Dec., 1916
B. T. LARSON, Minn.	Sept., 1917	W. SAUER, Minn.	Dec., 1916
H. SCROONOVER, N. Y.	Sept., 1917	F. F. DARLING, Cal.	Dec., 1916
PERFECTION SPRING CO., O.	Sept., 1917	CHAS. NEWLAND, Cal.	Dec., 1916
W. A. WILSON, N. Z.	Sept., 1917	J. T. BRAHM, Ia.	Dec., 1916
R. ROSS, N. S. Wales	Sept., 1917	P. H. ST. LOUIS, Wis.	Dec., 1916
I. E. SPROUD, Me.	Sept., 1917	A. E. NICKOLS, Okla.	Dec., 1916
FRED. BLOHM, Tex.	Sept., 1917	C. J. HALL, Wash.	Dec., 1916
C. T. WOOD, Kans.	Aug., 1917	BOS. FRICKE, Ala.	Dec., 1916
GEO. B. HEATON, N. J.	Aug., 1917	JOERIS BROS., Tex.	Dec., 1916
CLARK & FAUSET, Queens	Aug., 1917	R. CLEMENS, Conn.	Dec., 1916
C. L. HOCKETT, Cal.	Aug., 1917	SCHIFFLEY & SCHMITT, Pa.	Dec., 1916
H. C. STENZEL, Tex.	Aug., 1917	A. BRAUSE, Ohio	Dec., 1916
M. DEJAGER, S. Africa	Aug., 1917	J. E. BEATTY, Mo.	Dec., 1916
F. HOWARD, Kan.	Aug., 1917	GEO. CASIE, Scotland	Dec., 1916
H. FERREL, Ill.	Aug., 1917	JOHN KAIN, Ky.	Dec., 1916
J. McMERKEN, N. Z.	Aug., 1917	F. W. HOWELL, Ill.	Dec., 1916
F. H. GIERKE, S. Aus.	Aug., 1917	J. ROBERTSON & SON, Scot.	Dec., 1916
A. L. PITTENGER, Ill.	Aug., 1917	J. BRENT, S. Africa	Nov., 1916
F. SPINKS, England	July, 1917	W. M. GRIFFITHS, Aus.	Nov., 1916
J. P. KELLY, Md.	July, 1917	W. B. TAYLOR & SON, Mo.	Nov., 1916
F. G. STONE, S. Africa	July, 1917	G. WHITTEN, Mass.	Nov., 1916
H. J. DRYONSHIRE, N. Z.	July, 1917	J. M. VINCENDA, Wis.	Nov., 1916
V. J. HUBBARD, N. Y.	July, 1917	TOM NOLAN, S. Aus.	Nov., 1916
J. C. SKINNER, Vict.	July, 1917	H. J. FRENCH, N. Z.	Nov., 1916
H. A. CHEEVER, N. H.	June, 1917	F. N. BROWNING & SON, Ky.	Nov., 1916
D. SHAVER, N. Y.	June, 1917	J. MACUAB, Scotland	Nov., 1916
W. R. GELLING, S. Africa	June, 1917	P. GESSSEN, Ill.	Nov., 1916
J. H. BAKERBERG, S. Africa	June, 1917	J. W. GRIBBLE, S. Aus.	Nov., 1916
A. R. HALLENBECK, N. Y.	June, 1917	W. G. SIM, N. Z.	Nov., 1916
F. C. BOCK, Neb.	June, 1917	H. V. RUEHL, Ala.	Nov., 1916
H. SMITH, Queensland	May, 1917	G. LINDSBOG, Ind.	Nov., 1916
P. VANDERHAEGHEN, Mich.	May, 1917	PITTMAN STELL, N. C.	Nov., 1916
YOST & HALVORSON, Minn.	May, 1917	J. S. FINKENBERG, Ind.	Nov., 1916
W. MCCOY, Kan.	May, 1917	R. D. WIXOM, N. Y.	Nov., 1916
A. GUETTLER, Tex.	May, 1917	UNIVERSITY OF MICHIGAN	Oct., 1916
C. F. J. LORENZ, N. Y.	May, 1917	C. E. MONROE, Kans.	Oct., 1916
A. DATWYLER, Ohio	May, 1917	NICHOLS & SIEVER, Ark.	Oct., 1916
E. T. HOGMAN, Conn.	Apr., 1917	A. G. BINSON, Colo.	Oct., 1916
O. F. MATSON, Utah	Apr., 1917	E. W. PLOPPER, Mich.	Oct., 1916
F. PETTIT, Okla.	Apr., 1917	J. MIKULIK, Tex.	Oct., 1916
H. G. MARRIOTT, Utah	Apr., 1917	C. W. SCHMIDT, Cal.	Oct., 1916
E. THIBAUDEAU, Wis.	Apr., 1917	T. J. MAGUIRE, N. Y.	Oct., 1916
W. PICKERING, S. Africa	Apr., 1917	A. W. WAITE, Cal.	Oct., 1916
ED. BURROWS, England	Apr., 1917	C. W. ELLIS, Tex.	Oct., 1916
L. KAUSCH, Wis.	Apr., 1917	J. P. SIMMON, N. S. Wales	Oct., 1916
J. M. BROWN, Tex.	Apr., 1917	E. A. KNAPP, N. Z.	Oct., 1916
W. WATSON, Vic.	Mar., 1917	T. J. HASKINS, N. S. W.	Oct., 1916
W. BAGLEY, Mass.	Mar., 1917	LOTHIAN & SKINNER, N. S. W.	Oct., 1916
R. E. CAMPBELL, Mass.	Mar., 1917	W. B. KNOUFF, Ala.	Oct., 1916
P. RUFFER, Ill.	Mar., 1917	GORHAM BROS., Ia.	Oct., 1916
G. STANSKE, Wis.	Mar., 1917	W. H. F. BRAUCH, N. C.	Oct., 1916
W. H. MILLER, Mo.	Mar., 1917	CLARK OLDS & CO., Neb.	Oct., 1916
J. C. WOODS, W. Aus.	Mar., 1917	IRWIN SCOTT, N. Y.	Oct., 1916
C. BOULTON, N. S. Wales	Mar., 1917	C. E. DURHAM, Kan.	Oct., 1916
A. A. HAWKINS, Ore.	Mar., 1917	M. RINGO, S. Africa	Oct., 1916
C. L. MONTCOTT, W. Va.	Mar., 1917	W. DELLEY, Queens, Aus.	Oct., 1916
J. PETERSON, Ia.	Mar., 1917	C. D. HUSE, Pa.	Oct., 1916
J. ANDERSON, Tas.	Mar., 1917	E. M. PICKRELL, N. W. T.	Sept., 1916
A. J. NEILL, Vt.	Mar., 1917	M. HOSER, Mont.	Sept., 1916
ED. DETRICH, Ind.	Mar., 1917	P. C. WEDELL, Kans.	Sept., 1916
LEWIS CHASE, N. Y.	Mar., 1917	G. P. BLANCHARD, Ga.	Sept., 1916
E. O. LEE, S. Dak.	Mar., 1917	W. QUESINBERRY, Ore.	Sept., 1916
S. STEMPLE, Ohio	Mar., 1917	W. COLBECK, Mass.	Sept., 1916
R. S. GUGISBERG, Kan.	Mar., 1917	C. DEGROAT, Iowa	Sept., 1916
J. S. HASKELL, Col.	Mar., 1917	J. T. CASEY, Ky.	Sept., 1916
W. L. ROARK, Tex.	Mar., 1917	ROBT. ASMAN, Wis.	Sept., 1916
A. R. BARLOW, Tex.	Mar., 1917	E. F. WICKMAN, Ill.	Sept., 1916
C. A. WHITACRE, Ohio	Mar., 1917	C. L. MASSET, Ark.	Sept., 1916
B. P. CARNEY, Ill.	Mar., 1917	A. NAGLEY, Pa.	Sept., 1916
T. J. DORSEY, Conn.	Feb., 1917	H. A. CROOKS, Mo.	Sept., 1916
F. MARSH, Mich.	Feb., 1917	M. CARLSON, Minn.	Sept., 1916
J. H. WHITE, N. H.	Feb., 1917	W. H. ARTERS, Pa.	Sept., 1916
McGOWAN BROS., N. Y.	Feb., 1917	W. H. LEISTER, Ill.	Sept., 1916
J. W. HAUGHT, Ill.	Feb., 1917	W. E. STRANG, Ore.	Sept., 1916
IRVING BROS., N. Y.	Feb., 1917	E. F. HALLARON, R. I.	Sept., 1916
W. H. SCHNE, Neb.	Feb., 1917	A. F. BOND, Me.	Sept., 1916
A. J. H. WEGENER, S. Africa	Feb., 1917	C. T. HUMES, Del.	Sept., 1916
H. SCHNETTE, Ill.	Feb., 1917	J. ROPORD, Penn.	Sept., 1916
E. DOUGHRAN, Ohio	Feb., 1917	E. P. GATES, Mass.	Sept., 1916
CHAS. F. GIESE, N. Mex.	Feb., 1917	H. SCHNOKE, Penn.	Sept., 1916
M. E. GOLLE, Pa.	Feb., 1917	C. H. McCUTCHEON, Conn.	Sept., 1916
J. POTTHOFF, Neb.	Feb., 1917	J. K. HAWN, N. J.	Sept., 1916
G. M. GARETY, Mich.	Feb., 1917	T. M. BLACKMAN, Pa.	Sept., 1916
ERNEST FINLEY, Pa.	Feb., 1917	G. H. TORLINE, Kans.	Sept., 1916
A. TILLMAN, Cal.	Feb., 1917	S. B. PHILLIPS, W. Va.	Sept., 1916
WALKER BROS., N. Z.	Feb., 1917	G. E. HARPER, Texas	Sept., 1916
G. W. WHITTINGTON, W. Va.	Feb., 1917	J. J. ILLER, N. S. Wales	Sept., 1916
		JAMES POETTINGEN & Co., Mo.	Sept., 1916



Organization, Co-operation, and Your Trade Paper

ELBERT HUBBARD

Not long ago I visited the State Hospital for the Insane at Kalamazoo, Mich.

Walking over the beautiful grounds, half a mile from the main building I came across an attendant in charge of twenty-five patients.

The attendant was a little man, a sort of "half portion." Many of the patients weighed twice as much as he.

I walked along with him for some distance, and in the course of our conversation I said: "I don't want your job. What is to hinder half a dozen of these big fellows getting together and setting up a job on you? If they would get at you all at once you would not stand any show at all. There is no help within half a mile and you are not armed."

He looked at me in rebuke and remarked: "You belong here, all right! You ask what is to hinder these fellows getting together and setting up a job on me? Why, the fact is if they could get together with anybody or anything they would not be here. That is their trouble. Nobody is ever sent to an insane asylum who can do team work."

The badge of sanity is the ability to co-operate with other people; and the more people you can work with and for, the bigger and better you

are. It is an age of organization. Just now there are three big words. These are Reciprocity, Mutuality, Co-operation. And where do you find their principle carried out more than in your specialized trade paper?

Competition may have been the life of trade once, but it is no longer so. Competition died when the inventive genius of American engineers devised machines that should manufacture beyond the present economic wants of the people. Competition then became suicidal and destructive, and anything that is suicidal is dying—dead.

We have passed through the savage stage, the stone, the competitive, and now we are passing into the co-operative. We will not be here so very long, anyway, and soon Death, the kind old nurse, will come and rock us to sleep—and we had better help one another while we may.

The idea of the brotherhood of man is no idle, vacuous dream; and this ideal of brotherhood is coming about, not through the preaching of ethics or morality, but it is coming about as a matter of self-preservation.

Civilization is the best way of doing things. Civilization means the civil way, the mental, courteous, helpful way.

There is a natural tendency to specialize, these days. The man or firm who manufactures or sells one or more products, be it soap or shoes, pianos or cabinets, should know their business. If they know it less than from A to Izzard, they should busy themselves and get down to the source of supply (information)—their trade paper, and absorb with interest and studiousness all the meaty things found there pertaining and relative to their specific trade or craft. The specialized trade paper co-operates with, and reflects to, manufacturers and dealers, the good—the best means to a successful end. Co-operation is most essential to business life.

Simply because one is in the same line of business as another man, is no reason why he should attempt to destroy him. A certain amount of mutuality is absolutely necessary, to live. Increased consumption is the rule of every line of human endeavor.

There are bigger markets than the world ever before offered, and there is bigger pay for the man who can eliminate the grouch, get rid of his grab instincts, and regulate his gobble

and guzzle. That is, don't over-eat, don't over-drink, smoke one cigar at a time, think well of everybody, especially yourself.

Be proud of the business you are in. Stand by the whole fraternity. Don't knock competitors. I have noticed this, that the smaller a man's bean the more room there is in it for peeve. Little peanut men live by themselves; they do not read their trade paper, they think they have secrets, and they are afraid of somebody getting the secret away from them. The fact is, however, we only grow as we give, and anybody who locks the world out, shuts himself in.

I know hundreds of highly prosperous business men, manufacturers, dealers, jobbers, craftsmen, and I cannot recall a single instance in which the mentally successful man does not read his specialized paper. He subscribes for it, and he pays for it promptly. In many instances he orders extra copies, from time to time, and distributes them. He is boosting the whole game all along the line. And this very fact puts him in a frame of mind where currents of success come swirling in his own direction. He is moving on the eternal tide of progress.

When you subscribe for your trade paper, and assimilate it, you are uplifted, inspired, given courage, pep, intellectual vim and vigor and enough trade information to make you free from the trials and tribulations which beset the man who "doesn't know."

These things all have a direct influence on the bank and mental balance.

The trade paper binds everybody in the business into a fraternity, which spells length of days, because it "serves," and its service is based on specific knowledge.

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A Well-Equipped Kansas Shop

ED. BOHRER

I am sending to you a photograph of the interior of my shop which is 24 by 86 feet. I do all kinds of work. My tools consist of Trenton anvils, Little Giant belt hammer, Canedy-Otto drill, Little Giant hydraulic tire setter, Little Giant thread cutting machine, Skow disc roller, emery stand, rip saw, spring machine for tapering vehicle spring leaves, and electric power. I have all the small



tools for both wood and iron work, in fact all the tools that are necessary to run a first class shop. I have been here for seventeen years and have always enjoyed a good trade. I am shown in the picture. I have a helper who has been with me for four years, which speaks for his ability as a mechanic. We get good prices and all of the blacksmiths here are on very friendly terms.

The Business, from a Practical Smith's Viewpoint-2

H. M. TOTMAN*

How to Charge

If a dozen proprietors of custom and blacksmith shops were asked the question: "What is your basis for charging for work done?" some would answer, "Charge all you can get," while others would reply, "My competitor makes the price, and I must meet competition." Another says: "Add to cost of material used, a fair wage for work done." Now, if any of these people were asked to give an estimate of price for repairs to a smashed carriage, they would reply that it is largely "guesswork." We admit that all of these methods are faulty in principle and decidedly wrong in execution, and we also believe there is but one basis, viz., actual cost. Men will differ as to amount of profit desired, but all will admit that there must be some margin above gross cost. Hence, the first fact to ascertain beyond doubt, is true cost. There are three factors that enter into every commercial transaction, namely: Net Cost, Fixed or Overhead Expense, and Profit or Loss, as the case may be.

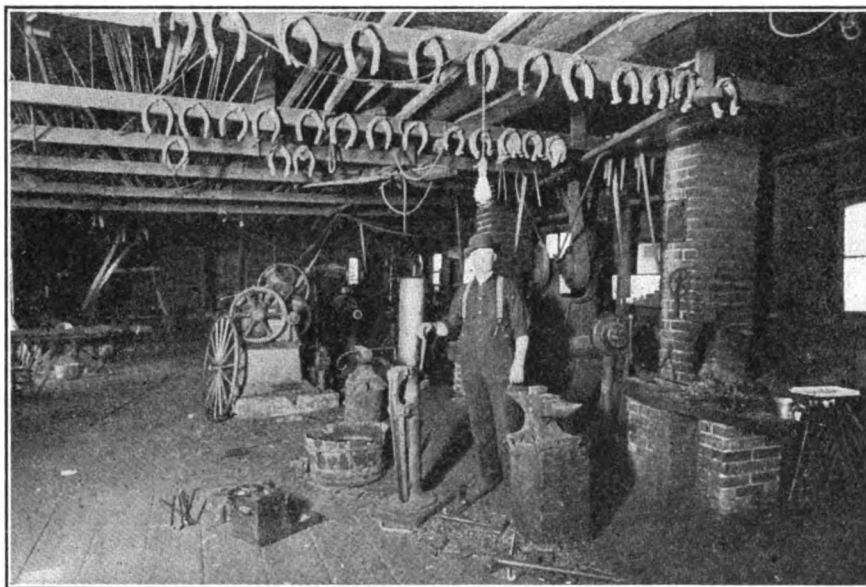
The first—material and mechanical labor done on the job—is easy enough to ascertain. The second—or "overhead expense"—is much more difficult, and men differ somewhat about this. We think overhead expense means all the expense of doing business except stock and labor. It will, of course, vary somewhat in different shops, due to local conditions, but all have it to some degree, and owing to the fact of this point being very often ignored, is due the failure to make the profit that should

be made if the rule were properly observed. Some of the items in overhead expenses are as follows: rent; interest on investment in stock and tools; insurance on stock and tools; fuel; water; lights; telephone; drayage; postage and stationery; tips and charities; repairs and renewal of tools; office help; management; etc. While this may seem quite a list, other items will be found from experience.

The man who has never tried keeping account of all these items for one year, can have no idea of the sum they aggregate. "But," remarks number one, "I own my shop, so don't pay rent." Nevertheless, your rental expense is approximately 10% of the value of your property (real estate). This allows for insurance on building, taxes, and repairs, and when located in a growing town or city, should be increased from time to

figure closely, but it is far better to pass work up, than to do it at an actual loss.

Now for the practical application: After keeping careful account of these and other items of expense for one year, we will have the means for figuring the ratio of overhead expenses to the total amount of business turned out. In city shops, this amount will be found to be about 25%. In country shops, about 20%. The most frequent mistake made, however, is in adding the 25% to net cost, forgetting that the 25% was on total business. For example: an annual business of \$12,000, with 25% overhead expense, or \$3,000, would leave \$9,000 for stock, profit and labor. Suppose stock and labor cost \$7,500, with a profit of \$1,500. The ratio of overhead expenses to net cost \$7,500 would be 40%, and so in figuring on a job, one should add 40%



A WELL-EQUIPPED KANSAS SHOP RUN BY MR. ED. BOHRER

time, in accordance with value increase.

City shops will have most of the other items, but some will not consider the items of office help, and management. It is very evident that even in the smallest shop, some time is devoted to the business end of the concern, and whether this time is one fourth or one half of the day, it is a proper charge to overhead expenses; and in shops where the entire time of the proprietor is thus used, his salary should be so charged.

When business is dull and competition active, one is very apt to

to net cost, instead of 25%, and right here is the cause of the failure of a great many merchants. The best practice is to figure percentages on selling price as follows:

Suppose our overhead expense is 25%, and we desire a profit of 20 %, and the net cost is \$5.50, what is the selling price?

Selling price.....	100%
Net cost.....	\$5.50 = 55%
Profit.....	2.00 = 20%
Overhead exp. '.....	2.50 = 25%

\$10.00=100% 100%

*Editor's Note:—Mr. Totman in this article gives readers some real, live figures to think about. Don't simply read his article. Read it, re-read, and then study it. Get out your pencil and a sheet of paper, and do some figuring. Get right down to brass tacks. Get this article, or at least the substance of it, burned into your memory—don't forget it—and then we'll leave the matter of prices and future business entirely to yourself. Read—Re-read—Study.



While this is the approved method, it is not absolutely correct, because of the fact that an investment of net cost, plus overhead expense, being \$8.00, gives a return of \$2.00, or 25% on the investment, instead of 20%. However, it will be seen that 25% overhead expense figured on the net cost of \$5.50, would give \$6.88, or only 88 cents margin. Many a business man has figured thus, and actually lost, when he supposed there was a profit.

Another important fact to remember is that any poor accounts made, any allowances on bills, etc., all come out of the season's profits, and not out of the aggregate of business done.

We have found it profitable at the end of the year, to analyze the business. Suppose, for example, the actual capital (not real estate) is \$3,000; business done, \$10,000; and overhead expense, \$2,500; net profit \$1,000; which shows a return on investment of 33⅓%; and this is mighty good business. If the owner allows salary for management.....\$1,000
He has for rent, net..... 200
Profit 1,000

Total income.....\$2,200

Is not the answer to the question clear?

The ratio of overhead expense is higher in our business than in most others. Hence, the percentage to be added to net cost must naturally be greater. We figure 65% on net cost is about the lowest figure that will afford a margin of profit, while in many cases it will require nearly 100%.

It must not be forgotten that all the branches of our business do not pay alike. The paint shop is the "bete noir" (bug-bear) of the whole business, but this phase of the subject will be dwelled upon later.

Any questions bearing upon the subjects discussed will be gladly answered if it is within our power.

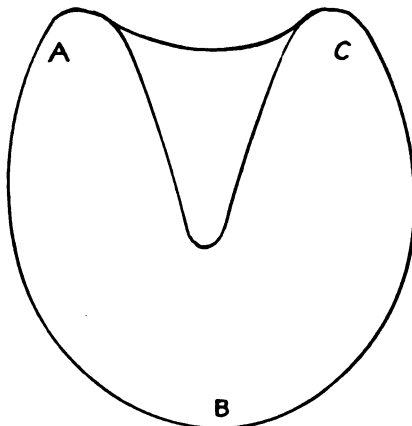
Thoughts on Timely Topics

By THORNTON

Caustic Censure and Cheery Comment

THIS APPRENTICE QUESTION has two sides if you will just stop to think a minute. What made me realize it as a very decided two-sided matter was the way one old smith was carrying on about the boys he'd

"raised in the trade." This old chap said (between "chaws" at a big "gob" of "Battle Axe" that poked his cheek out like that shoe boil on Hank Piper's old mare) that "every mother's son of the whole blamed passel of youngsters" that he trained were ungrateful, disobedient and "never appreciated the



SEE THE POSITION IN WHICH THE INTERFERING FOOT IS CARRIED

sacrifice" he'd made for them. This kind of talk sounds good to the men who usually deliver it, but I happened to know how this old man "sacrificed" for the boys he had. He figured on getting as much out of each boy as the ordinary reasonable smith expects to get out of a two horsepower gas engine. And the old man gave the boys in return about as much as would keep a canary bird from starving. When a baseball game was pulled off or when there was a circus in town the old man took it in and the boy stuck around the shop "to watch things." Of course no regular wages were ever paid—that was in the agreement of apprenticeship and the boy understood it—but there were no decent clothes forthcoming, either. The store suits that old boy-cussing miser handed to his apprentices weren't fit for a Fiji Islander where fashions and styles are taboo. Whenever I come across one of these old-time plug-eating, boy-cussing skin-flints I thank the Lord that the tribe is fast becoming extinct and that "there are only a few more left"—as the old patent-medicine vender says.

THE AUTOMOBILE REPAIR proposition is one each smith has got to solve for himself. If repairing the buzz-carts is going to interfere with your regular business, why, in the name of Vulcan, don't! But if you can add

automobile profits to a blacksmithing bank account do so by all means. There's no reason on this old gasoline-perfumed earth why you can't do auto-work—I mean as far as the mechanics of it goes. In fact, from what I can observe, a good blacksmith is a better mechanic than the great majority of fee-grasping experts ground out by the so-called auto-correspondence schools.

LIFE IS NEVER AGAIN SO FULL of real, honest, healthy pleasure and joyousness as when in the days of boyhood we played in the puddles and ponds left by the rain. We can get a good many ideas for healthy pleasure from children; yes—and we can draw a good many contrasts. For example, speaking of puddles—water fascinates a healthy child (seems to be repulsive for use in any way to some grown-ups), and if the water is flowing, a good healthy boy will get more of a real good time out of damming it, making pools, lakes, rivers and falls, than a whole boatload of grown-ups can get from Duluth to New York. The secret is the youngster's imagination, which is just about the most active thing in seven States. The child doesn't need anything elaborate to amuse him. All he needs is a suggestion. In the case of the puddle it soon becomes a fairy lake and the ditchlet a roaring river; and that's as it should be with grown-ups. Watch a healthy boy at healthy play and you'll soon discover that it isn't necessary to equip yourself with a barrel and a spigot to get all you should out of playtime. Some men think they are having the greatest time of their lives when they are filling up their "innards on rot-gut," and trying to sing meaningless songs.

Some Practical Pointers on Several Topics

JOHN DENBO

I have been a subscriber to your paper for some time, and I consider it a fine plan to review back numbers, for ideas. I keep my copies in book form, and have a reference page to guide me to just the subject I wish to find in any one of the volumes.

On Shoeing

I have been in the general blacksmith and shoeing business for twenty-five years, and have made a very deep study of shoeing. I have



read closely each article you publish on this subject, and get some very good ideas from these articles. The subjects of interfering and over-reaching and knee-banging are subjects that all our readers should study. During my experience in shoeing, I have found that for the interfering animal it is best to ascertain in what position the horse carries his feet when they are off the ground. For example, a horse that knee-bangs, or hits ankles, carries his foot pointed in. Now, take the imaginary line, running perpendicular with the horse, and line running through the center of the foot. We will dress the right front foot, for example, and start to dress at A (see engraving) down to B, and taken up to C, this will throw the toe to the left of the line. Now put on a plain shoe for interfering, dressing the foot in the preceding manner, and this will make the foot lower on inside. For shoeing behind, don't turn the outside calk out; let the shoe balance the foot around.

I see in your August number, that T. R. Womble wants the definition of a scientific horseshoer. The scientific horseshoer, in my estimation, is a prevaricator of the highest magnitude, with all the prefixes you can put to it. I hope this will satisfy him. I think it would be well for him to consider himself a practical horseshoer, and draw his colors down with the rest of us "don't-know-it-alls."

For Hardening Plow Lays

In regard to Mr. Anderson, of So. Dakota, requesting a compound to harden plow lays, I would suggest his using the following: To 1 lb. of borax, add $\frac{1}{2}$ lb. of salt; 2 ounces cream tartar; 1 ounce of saltpeter, and 3 gallons of rainwater. Put in earthen vessel, and allow to stand twelve hours. Get your work to a cherry heat, and drop into this bath, allowing to remain until cool. This is a fine bath for tempering all steel.

For Fitting Rims

I will also send sketch of a device (see engraving) for putting on a heavy bent rim, as follows: For putting on a 3-inch rim, take one ordinary strap hinge, 3 inches wide. Size of timber to use, about $3\frac{1}{2}$ by 2 inches hickory. For wider circle, move hinge up on 6-foot piece. Place your rim on, first, two spokes to right. Drive on as far as you can place your machine, and push toward hub, and

you have it on. The end irons are to be of $1\frac{1}{2}$ or $1\frac{3}{4}$ by $\frac{1}{2}$ inch, bolted on; $5\frac{1}{4}$ long on one end, and same on other, bolted on.

The Boss's Eye

A. M. BURROUGHS

"Yes, all these things are true," says the smith who has read these articles, "but how am I going to stop these leaks. I may be so busy out on the sidewalk shoeing horses, that I don't know the gasoline barrel is leaking in the shed."

That is just why this book was written. No proprietor who is working on the sidewalk, or behind the anvil, for that matter, can keep track of all the leaks, unless he is in a one-man business and is selling everything for cash to those who carry the goods home.

Then, the stock on the shelves, and the cash in the bank and in the cash drawer, are his assets.

He may be able to sell the goods or make a physical inventory, in a

tell him the true value of all this activity.

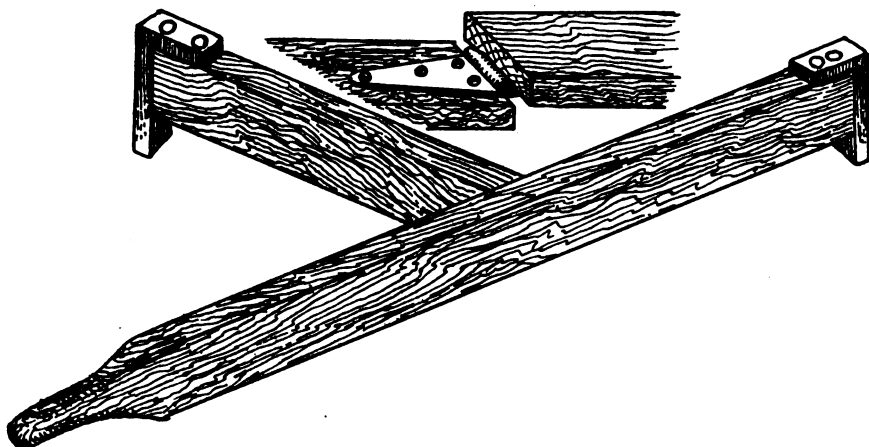
Any system is just a method by which the Boss may keep his eye on the results of his business. With an adequate system, he can have in one place an accurate reflection of all that goes on in his business.

The system is an accounting system because it *accounts* to him for every penny that he gets and every penny he pays out, in time, work or goods.

According to the thoroughness and efficiency of the system in searching out and telling the whole truth about the activities of the business, depends whether the Boss's Eye has a chance to see the things it ought to see.

If the System is right, then it is up to the *Eye* to see the facts, and the *Judgment* to use them.

The System will not *do* anything. It will only show the *Eye* what *ought to be done*.



A DEVICE FOR FITTING RIMS IS EASILY MADE OF GOOD HICKORY

single day—and count his money in a few minutes.

What he *owes* are his *liabilities*.

Everything is under his own physical eye; he could tell in a short time just what he is worth.

When he begins selling on credit, enlarges his business, by adding one or fifty or a hundred employees, buys stock that is stored below and above, and starts new departments, *then* he no longer has the business under his eye—the gasoline barrel may empty itself without his being the wiser. Hence he must have a system that will keep a *record* of the *results* of all the activities of his people—of the incoming and outgoing—that will

It all comes back to the Boss with the *Eye*.

No matter how handsomely bound, or prettily ruled, the pages of the account books—no matter how bright and new his pens and blotters, or how polished the cash register and how modern the adding machine—these alone won't make a business successful.

They are only the most efficient means by which to attain an end.

No matter, on the other hand, how clever the *merchant*—if he has no books of account, or if he has incomplete accounting books, and inefficient methods of handling them, he can't make the profits of the man



who is his equal in merchandising ability, and who has a thorough system, efficiently handled.

All businesses are "different"—because each one has an individuality—just as all horses are "different." But there are certain horse qualities common to all.

So all retail businesses are alike in the things which make them retailers and not manufacturers, or railroads, or even wholesalers.

All accounting principles are the same—always; but the methods of applying them may vary.

The other day a smith who had been doing a fair business, said: "My business has been increasing right along year after year, and very much more than expenses have increased. So it seems to me that I ought to be making quite a little more money than I am."

He consulted an old business friend about it.

They looked over his books, which had been carefully kept by a young man who had "picked up bookkeeping."

It soon appeared that the smith's

keeper was put to work—and he soon found that a trusted employee had been stealing the profits.

The *ineffective* accounting method couldn't show that fact—therefore the Boss's Eye could not see it.

It is not the purpose of these articles to show a smith how to install a system of accounts. It is our purpose to show him *why* he should have all the facts.

Here is shown a list of accounts which a smith who rents his shop and has, or has not, a perpetual detailed inventory, must have, to intelligently manage his business.

This list is offered merely to show the kinds of information which a smith must have, to be safe.

Remember, there are three things you *must* answer:

1—Where is your cash and how much have you?

2—How much do you owe?

3—Where's the stock you bought, how much have you used or sold, and how much have you on your racks?

If you have a system of accounts that tells you these things, you have:

1—Protected yourself in *knowing* what you are *doing*, and by knowing the *value* of your activity.

2—Protected your family—your wife and children—so when you are called away, your administrator or executor won't have to report that "he left his estate in a badly tangled condition." Neither will they lose through most of what you leave being eaten up in the process of untangling your affairs.

3—Protected yourself against fire loss, because without a system of accounts you would probably be unable to prove more than 60 or 70 per cent of your loss.

4—Given yourself a chance to use all the credit you are entitled to at the bank, by having an accounting system that shows what you are doing, and that *you know* what you are doing.

Now, get started right on this matter of an accounting system.

Don't fool with makeshift systems—short-cut ideas that cut the essential facts out of the statements you get.

A great manufacturer of accounting systems largely used by retailers, wrote the writer the other day:

"I have from my experience come to know that the rank and file of

A PRIZE CONTEST

From time to time we receive very clever letters from our friends and subscribers—letters full of original thought—some humorous, some grave, all good, pleasant reading. To encourage clean, clever, original letters of this kind we offer prizes as follows:

FIRST PRIZE - - \$50.00 IN GOLD

SECOND PRIZE - A GOLD WATCH

THIRD PRIZE - - A FOUNTAIN PEN

for the cleverest letter accompanying a subscription remittance of one dollar or more and received during 1913.

The letters may be humorous or grave; they may contain kicks or bouquets; they may be written in rhyme or prose—but they must be clean, clever and original, and accompanying a subscription remittance of one dollar or more.

As an example of the kind of letters we want, the following received from Mr. Tom Roop of Ohio is an exceedingly clever one:

Dear Editor Bernhardt:—

Please find enclosed an unfolded sample sheet of Uncle Sam's paper of recent issue upon which you will observe certain figures and pictures, solid valuable reading matter and no fiction. No claim is herein made that this enclosure in weight or intrinsic value equals your yearly enclosure to me, but it is customary for an orthodox subscriber when he has a \$ about his person for which he can find no present or future use to shy it at the Editor's plethoric purse through the mail or by some other artful agency, and against his vicious practice the hapless Editor seems to have no adequate means of self-defense.

Your sympathetic friend,
Tom Roop

P. S. I will surprise myself and take out two years', Christmas.

Get your "funny bone," your "bump of cleverness" and your "dome of originality" to working—make a grab for those fifty round little pieces of Uncle Samuel's favorite product. Get busy now, whether your subscription expires now or later—but get busy, then you'll have your letter ready. Remember—cleverness and originality are the deciding points. The judges will be announced later. The contest closes, December 31, 1913.

You may have loose-leaf books or card-ledgers, but your debit and credit will be the same: you may use a cash register, but you'll have to have a double entry set of books, or your credit won't be as good as the credit of the man who *does* have such a set of books.

books were not kept so he could show how the gross profits of any month compared with any other month. The books could not show for any particular period whether expenses had increased out of proportion to other things.

Then his friend's expert book-



small retail merchants care little or nothing about system in their business, and this accounts for the large proportion of failures. Even after we succeed in installing one of our systems, very few of them will use it correctly; therefore, their success with it is limited. They merely want a system or device that will relieve them of the bookkeeping, yet they are not willing to do the little extra work necessary to compile the comparative statements of their business which would enable them to more intelligently determine just what progress they are making."

Get the facts. Get a bookkeeper *who knows how* to help you. Get started right. Then have an expert come in once in a while (say every three months), and check up your work—just to keep you on the right track.

Then keep your Eye on the Expense and Income accounts.

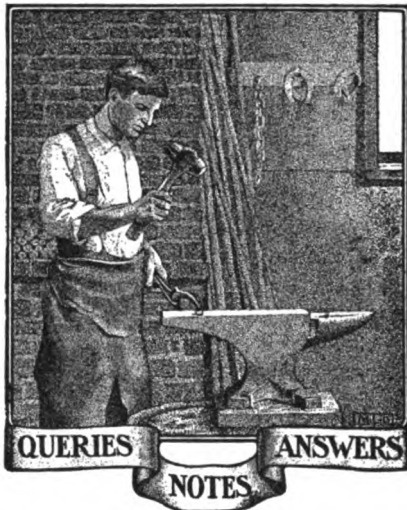
When the former jumps, dig into it, and find out *why*.

When the latter decreases, dig again, and find the reason; when it increases, find out what produces the effect, and push that good thing for all you are worth.

Keep your Eye on the facts of the business. It can't see too many, and you can't know too much about what those facts really mean.

That is why the big business has an accounting system; and why no permanently successful business, big or little, has ever gotten along without an adequate bookkeeping system.

No business man has ever been a *failure* because he *had* a bookkeeping system. No business man has ever been *successful* because he *didn't* have one.



A Rivet Furnace.—Will some reader of this paper please advise me how to build an oil burning furnace for heating rivets?
KARL RATH, Alabama.

Axles and Axle Setting.—I would like to have some brother of the craft advise me the correct length of a front axle, and also a rear axle. Also kindly advise me the correct way to set them up, and if possible, give sketch of same.
W. E. RIFFE, Kentucky.

A Question on Stock.—I would like to ask some brother blacksmith how much $\frac{1}{2}$ by $1\frac{3}{4}$ -inch stock will it take to make a $5\frac{1}{2}$ -inch circle bent edgewise?
N. H. BROWNING, Montana.

In Reply.—If the ring to be made is to have an inside diameter of $5\frac{1}{4}$ inches, the amount of stock required will be $22\frac{3}{4}$ inches.
A. L. M., New York.

An Iowa Shop, and Some Questions.—I am sending you a picture of my new shop, which I built last year. It is 22 by 80, and my equipment consists of the following: One hand blower for the shoeing fire, and an electric blower for the back fire where all my plow and heavy work is done. Also have an electric drill, a Little Giant trip hammer, a Universal woodworker, a Little Giant hand-bolt threader which cuts to one inch, with the regular screw plates of the same size, a Reynolds tire bolter, a large emery stand, disc sharpener, and a splendid assortment of smaller tools. I intend getting a good heavy cold shear and punch. I have one small shear, but it is not very satisfactory, on account of cutting both hot and cold iron with it. Can some brother tell me through these columns, a good make of cold shear, that will cut one-inch round bar without a great deal of effort.

There is another thing I would like to be informed upon, and that is, where I can get a good skate sharpener. One that will grind the skate a little hollow, and do it quickly. I will certainly appreciate any information on these subjects which the brothers will be kind enough to give me.

W. D. VALENTINE, Iowa.

The Grading of Vehicle Wood Stock

White Oak Wagon Spokes
(Wagonmaker's Grades)

RULES

(Second Growth Grade)

Material.—Spokes of this grade are to be made from first quality timber, practically clear and straight-grained, of heavy weight and very dense growth that will indicate the very greatest strength.

DEFECTS

Checks.—Small fine checks not to exceed 2 inches in length and not running into the shoulder admitted.

Splits.—Not admitted.

Cross Grain.—Grain which does not run at a greater angle at any one point than 1 inch in 24 inches admitted. Curly spokes are considered cross-grained and not admitted.

Knots.—Spokes having knots will not be admitted, but spokes showing a small sound spot having the appearance of a knot, but which is only a surface blemish, will be admitted.

Sap.—Half sap that is bright and sound admitted.

Bastard.—Not more than three-fourths bastard will be admitted.

Other Defects.—Evident defects not above enumerated not admitted.

"A" GRADE

Material.—Spokes of this grade are to be made from live timber of dense growth, good weight, practically clear and straight-grained.

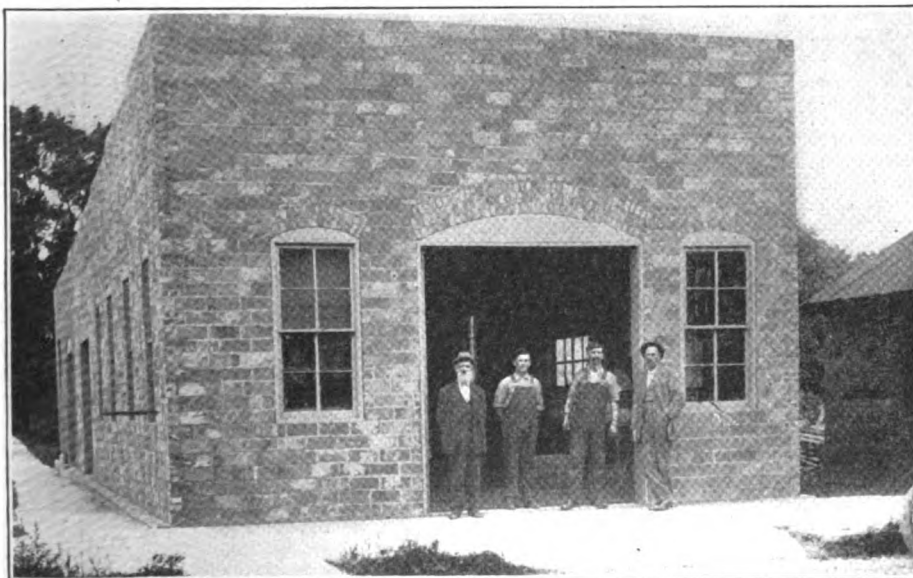
DEFECTS

Checks.—Small, fine, season checks not to exceed 2 inches in length and not running into shoulder admitted.

Splits.—None admitted.

Cross Grain.—Grain which does not run at a greater angle at any one point than 1 inch in 20 inches will be admitted. Spokes reduced from the second growth grade by reason of cross grain will be admitted in this grade when the grain does not cross at a greater angle than 1 inch in 18 inches. Curly spokes are not admitted.

Knots.—Knots will not be admitted, but spokes showing a small, sound spot having



A WELL-EQUIPPED GENERAL SHOP OF IOWA, RUN BY MR. W. D. VALENTINE



WESTERN REGULAR AND WIDE POINT PATTERN

Size of Spoke	Width of Tenon	Thickness of Tenon	Length of Tenon
1 1/2	1 1/2	1 1/2	1 3/4
1 1/4	1 1/4	1 1/4	1 3/8
1 3/8	1 3/8	1 3/8	2
1 1/2	1 1/2	1 1/2	2 1/8
2	2	2	2 1/4
2 1/8	2 1/8	2 1/8	2 3/8
2 1/4	2 1/4	2 1/4	2 1/2
2 3/8	2 3/8	2 3/8	2 5/8
2 1/2	2 1/2	2 1/2	2 3/4
2 5/8	2 5/8	2 5/8	2 7/8
2 3/4	2 3/4	2 3/4	3
2 7/8	2 7/8	2 7/8	3 1/8
3	3	3	3 1/4
2 1/2	3 1/4	1 1/4	3 3/8
3 1/4	3 1/2	1 3/8	3 1/2

* Signifies full size.

CALIFORNIA PATTERN

Width of Tenon	Thickness of Tenon	Length of Tenon	Allowance for Shrinkage half-dry stock
2 1/4	1 1/4	2 1/2	1 1/2
2 1/2	1 1/2	2 3/8	1 3/4
2 3/4	1 3/4	2 1/2	2
2 1/2	1 1/2	2 3/4	2 1/8
2 3/8	1 3/8	2 3/4	2 1/4
2 1/2	1 1/2	3	2 1/2
2 3/4	1 3/4	3 1/8	2 3/4
2 1/2	1 1/2	3 1/4	2 5/8
2 3/8	1 3/8	3 1/2	2 3/4
2 1/2	1 1/2	3 3/4	3
2 3/4	1 3/4	4	3 1/4
2 1/2	1 1/2		3 1/2
2 3/8	1 3/8		3 3/4
2 1/2	1 1/2		4

TABLE 1—SPECIFICATIONS FOR WESTERN REGULAR PATTERN AND FOR CALIFORNIA PATTERN

the appearance of a knot, but which is only a surface blemish, will be admitted.

Sap—Half sap that is bright and sound admitted, but when of the second growth grade or very dense growth reduced by reason of having too much bright sap, will be admitted to the extent of two-thirds bright sap.

Bastard—Not more than half bastard will be admitted.

Dips—Spokes having dips not more than one in a spoke and located anywhere except at shoulder or tenon admitted, provided such dip is not more than 1/4 inch in depth and not less than 4 inches in length.

Other Defects—Evident defects not above enumerated not admitted.

"B" GRADE

Material—Spokes of this grade are to be made from timber of a weight and growth that will indicate fairly good strength.

DEFECTS

Checks—Small, fine, season checks, not to exceed 2 inches in length and not running into the shoulder, admitted.

Splits—None admitted.

Cross Grain—Cross grain which does not run at a greater angle at any one point than 1 inch in 16 inches admitted. Spokes reduced from the second growth grade because of excessive cross grain, but in which the grain does not run at a greater angle at any one point than 1 inch in 14 inches, admitted.

Spokes reduced from the "A" grade for cross grain will be admitted to this grade if grain does not run at a greater angle than 1 inch in 15 inches.

Knots—Knots will not be admitted, but spokes showing a small, sound spot having the appearance of a knot, but which is only a surface blemish, will be admitted.

Spokes reduced from the second growth and "A" grades having one sound knot not over 1/4 inch in diameter, showing only on one side, and not within 5 inches of either end of the spoke, admitted here.

Sap—Half sap that is bright and sound will be admitted.

Bright all sap spokes of second growth grade admitted.

Spokes from "A" grade having three-fourths sap admitted.

Bastard—Not more than half bastard will be admitted.

Spokes of second growth grade will be admitted in this grade where full bastard.

Spokes of "A" grade will be admitted in this grade where three-fourths bastard.

Dips—Will be admitted in this grade where not more than one in a spoke and located anywhere except at shoulder or tenon, provided such dip is not more than 1/4 inch in depth and not less than 4 inches in length.

Worm Holes—Black and pin worm holes in either second growth or "A" grades of timber will be admitted here to the extent of not more than three in any spoke, but these must not be bunched. Powder post worm holes not admitted.

Other Defects—Evident defects not above enumerated not admitted.

Size of Spoke	Total Length of Head and Throat	SIZE OF HEAD		SIZE OF BARREL		SIZE OF REGULAR POINT		SIZE OF WIDE POINT	
		Width	Thickness	Width	Thickness	Width	Thickness	Width	Thickness
Dry.....1 1/2	6 3/4	1 1/2	1 1/8	1 1/2	1 1/8	1 1/8	1 1/8		
Green....1 1/2	6 3/4	1 1/2	1 1/8	1 1/2	1 1/8	1 1/8	1 1/8		
Dry.....1 3/8	6 7/8	1 3/8	1 1/4	1 3/8	1 1/4	1 1/4	1 1/4		
Green....1 3/8	6 7/8	1 3/8	1 1/4	1 3/8	1 1/4	1 1/4	1 1/4		
Dry.....1 1/2	7	1 1/2	1 1/8	1 1/2	1 1/8	1 1/8	1 1/8		
Green....1 1/2	7	1 1/2	1 1/8	1 1/2	1 1/8	1 1/8	1 1/8		
Dry.....1 3/4	7 1/8	2 1/8	1 1/4	2 1/8	1 1/4	1 1/4	1 1/4		
Green....1 3/4	7 1/8	2 1/8	1 1/4	2 1/8	1 1/4	1 1/4	1 1/4		
Dry.....2	7 1/4	2 1/4	1 1/2	2 1/4	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
Green....2	7 1/4	2 1/4	1 1/2	2 1/4	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
Dry.....2 1/8	7 3/8	2 1/8	1 3/8	2 1/8	1 3/8	1 3/8	1 3/8	1 3/8	1 3/8
Green....2 1/8	7 3/8	2 1/8	1 3/8	2 1/8	1 3/8	1 3/8	1 3/8	1 3/8	1 3/8
Dry.....2 1/4	7 3/2	2 1/4	1 1/2	2 1/4	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
Green....2 1/4	7 3/2	2 1/4	1 1/2	2 1/4	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
Dry.....2 3/8	7 5/8	2 3/8	1 3/4	2 3/8	1 3/4	1 3/4	1 3/4	1 3/4	1 3/4
Green....2 3/8	7 5/8	2 3/8	1 3/4	2 3/8	1 3/4	1 3/4	1 3/4	1 3/4	1 3/4
Dry.....2 1/2	7 7/8	2 1/2	1 1/2	2 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
Green....2 1/2	7 7/8	2 1/2	1 1/2	2 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
Dry.....2 3/4	8	2 3/4	1 3/4	2 3/4	1 3/4	1 3/4	1 3/4	1 3/4	1 3/4
Green....2 3/4	8	2 3/4	1 3/4	2 3/4	1 3/4	1 3/4	1 3/4	1 3/4	1 3/4
Dry.....2 1/2	8 1/8	3 1/8	1 1/2	3 1/8	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
Green....2 1/2	8 1/8	3 1/8	1 1/2	3 1/8	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
Dry.....3	8 1/4	3	1 1/2	3	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
Green....3	8 1/4	3	1 1/2	3	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
Dry.....3 1/4	8 1/2	3 1/4	1 3/4	3 1/4	1 3/4	1 3/4	1 3/4	1 3/4	1 3/4
Green....3 1/4	8 1/2	3 1/4	1 3/4	3 1/4	1 3/4	1 3/4	1 3/4	1 3/4	1 3/4
Dry.....3 1/2	8 3/4	3 1/2	1 3/4	3 1/2	1 3/4	1 3/4	1 3/4	1 3/4	1 3/4
Green....3 1/2	8 3/4	3 1/2	1 3/4	3 1/2	1 3/4	1 3/4	1 3/4	1 3/4	1 3/4

* Signifies full size.

TABLE 2—SPECIFICATIONS FOR TURNING STANDARD WESTERN PATTERN AND WIDE POINT CLUB SPOKES FROM DRY AND GREEN STOCK

MANUFACTURE

The following suggestions are made to the manufacturers of spokes, which, if heeded, will not only result in more perfect product, but will remove the cause of much dispute and dissatisfaction.

It is shown that there is a great deal of complaint on account of poorly manufactured spokes, such as tearing in the barrel by the lathe knives or by the adjustment of the knives not being in line, making thick and thin places along the barrels; the grain pulled out; also, rough machine work in the throat, or on the tenons, by which the corners may be chipped off, the tenon not even thickness and not in the center of the spoke. There should also be great care taken in the facing of the spokes, so that the face and the back are square with the tenon, and not diamond shaped, as is so frequently the case. Spokes should also be well sanded with a view of having them clean and smooth.

It should also be understood that all spokes made under the foregoing rules will be branded only "Second Growth," "A" and "B" respectively, and that in no case will the spoke manufacturer brand these grades higher or lower than they will inspect under these rules, nor will the wagon manufacturer request it. No restriction, however, is put upon the use of special brands.

SPECIFICATIONS FOR FINISHING OAK SPOKES FROM DRY STOCK

(See table in this article)

Tenoning—Make the tenon even thickness throughout, and in the center of barrel and straight with the face. Dish the shoulder so that when two spokes are placed face to face about 1/4 inch apart at the shoulder and the points touching the shoulders will come to a straight line so that a common rule placed flat on the tenons, the edge of the rule should touch the shoulders all the way across both spokes.



The above specifications for thickness of tenons are for thoroughly dry stock. When half dry, add allowance given; for entirely green stock, add double this allowance.

Throating—Make the shoulder the same thickness as the barrel. Shape the knives to make the throat about $\frac{1}{2}$ inch thinner than the barrel; also make the throat a little full near the shoulder to give strength and prevent splitting off in driving. Shape the forms or cams to make the throat rounding, so the face and back will not be too large, but well proportioned. The back must be proportionately wider than the face. Adjust machine to make shoulder straight (neither rounding at the corners, nor hollow in the center). Care should be taken to make both sides of the throat the same shape.

Facing or Jointing—Take measurements for width of tenon at the shoulder. Face the spoke as nearly as possible to a straight line from the point end to the tenon end, and back the spoke as nearly as possible to a straight line from the point end to the shoulder. Taper the back of tenon on a straight line from the shoulder to the end, so the tenon will measure $\frac{1}{4}$ inch less in width at the end (where it enters the hub) than at the shoulder.

The specifications in table 1 for width of tenons are for thoroughly dry stock. When half dry, add allowance given; for entirely green stock, add double this allowance.

Allowance for Shrinkage—For spokes turned from stock from six to eight months old, and spokes turned from green stocks that have been under shed for three or four months, may be considered half dry, for which allowance is given above. For green stock, double this allowance.

Total Length of Head and Throat—Make exact length to figures given from head end to where throat and barrel knives lap; the head or square must be at least of ample length for tenon.

Size of Head—Make measurements about where shoulder will be when tenoned.

Size of Barrel—Make measurement just below where barrel and throat knives lap. Make hinds exact width as figures given. Front spokes having more taper should be made $\frac{1}{4}$ inch less in width of barrel.

Size of Point—Measurement to be made $\frac{1}{2}$ inch from point end of all lengths. From face to back is to be considered the wide way.

Regular Lengths—Fronts, all sizes, 22 inches long; hinds, all sizes, 2 $\frac{1}{2}$ inches and under, 26 inches long; all sizes, 2 $\frac{3}{4}$ inches and over, 28 inches long.

The specifications given for dry are intended for thoroughly dry stock at least twelve months or more old; and for green are intended for entirely green stock. When stock is half dry, say six months old, allow for shrinkage about half the difference between dry and green specifications. When not quite dry, make a little full of dry specifications. When not quite green, make a little scant of green specifications.

Keep your lathe knives adjusted to a straight line, so the spoke will be of even thickness from the point to the throat.

This cost-accounting matter is not a question of figuring more expenses into your cost of doing business or into your selling prices, but a matter of figuring correctly the expenses you have always had, but upon which a proper accounting has not been made. Many smiths think this "new wrinkle," as they call it, is figuring in new and additional expense. It is simply a matter of having the same expenses of business that you have always had, and a question of knowing them or not knowing them. The expenses are there—whether you know them or not—and when called upon to meet an expense, 'tis best to know all about it.



Too much care cannot be taken in seeing that no dirt or waste is put into the oil reservoir of a car, as one or more of the leads may be clogged up, and before it is noticed a bearing may be ruined.

When a brake is overhauled or repaired in any of its sections or parts, see that all of the movable joints are working easily, that they are not unduly worn, and that all nuts, bolts, pins and cotters are in place. It may prevent an accident, to look after these matters.

A short circuit may occur through defective insulation in the wiring of the coil, and this can only be traced by the working of the coil itself. Water acts as a conductor, and if the insulation is saturated with water or liquid mud, this condition will surely cause trouble. The only remedy is to protect the wire properly.

Rainwater is best for the cooling system. The use of ordinary water, especially that obtained in some regions, means that a deposit of mineral matter is constantly

being made in the water jackets and radiators. This deposit not only makes cooling more difficult, but predisposes the radiator to premature leaks.

All connections of the mixture inlet pipe of a multi-cylinder engine should be perfectly tight. Slackness at any point permits the entry of a certain quantity of extra air, which renders the operation of starting the engine more difficult and reduces the power. Many cases of poor running, which have been difficult to locate, have been due to this point.

An over-tightened nut, bolt or spark plug is sometimes hard to remove, through having become rusted in. The use of undue force may easily ruin the thread; therefore, treat plentifully with kerosene, leaving ample time to let it soak in. This procedure will, in nine cases out of ten, make the offending part easy of removal. Before putting in again, smear the thread with a paste made from flake graphite and gasoline, when it will be found that the parts will not stick again.

Replacing pistons in their cylinders is sometimes attended with considerable trouble, due to the difficulty of starting the rings into the cylinder bore. If too much force is used, the rings may be injured. A turn of fine steel wire should be taken around each ring, and its ends drawn together so tightly that the ring is compressed below the level of the piston surface. After the edge of each ring has entered the cylinder, the wire can be clipped off.

A good internal bath occasionally, will make a wonderful difference in the running of an engine. In the case of a car that is run every day, an internal wash should be given once every two months. The dirty oil should be drained off and the crank chamber plugs replaced. Then pour a liberal quantity of kerosene in the engine, and run it for about one minute. The kerosene should then be drained off and new, clean oil put in the machine.

To keep windshields transparent in rainy, snowy or freezing weather, various methods have been recommended. The following stunts have been found quite successful:



THE POWERFUL TRACTOR ASSISTS THE AGRICULTURIST IN ALL OF HIS OPERATIONS



A mixture of kerosene oil and glycerine rubbed on the surface of the glass will keep it from clouding in wet weather. Another specific method is as follows: Mix glycerine and alcohol in equal parts and apply to the glass with a wide camel's hair brush. The alcohol will soon evaporate, leaving the glycerine which will keep the glass bright and clear in any kind of weather. This compound will stay on the glass several days before renewing is necessary.

with a center punch and a hammer. Tap the punch smartly near the edge of the bolt in order to get it to travel round. If well lubricated with kerosene, this method will be found successful.

A Profit-Making Stunt, described by one practical smith, is suggested by him to all his auto-owning customers who care for their own cars. This smith evidently realizes how unhandy it is at times to be compelled to look for a screwdriver of a

When repainting a car, two coats of the following will be found most suited for muffler and exhaust piping: Boiled linseed oil, $\frac{1}{2}$ lb.; japan varnish, $\frac{1}{2}$ lb.; spirits of turpentine, $\frac{1}{2}$ lb.; lamp black, $1\frac{1}{2}$ oz.; pure powdered graphite, $1\frac{1}{2}$ oz.; powdered oxide of manganese, $\frac{1}{2}$ oz. First mix the linseed oil and the japan varnish well together, then add, in the order named and stirring all the time, the lamp black, the graphite and the powdered manganese. The solids should be added slowly, and the stirring briskly maintained. As the mixture thickens, thin it down with the turps until the quantity mentioned is added. This paint should be used at once, for it dries rapidly, and every time the brush is dipped, the mixture should be carefully stirred. It is well to paint the muffler while it is hot, first cleaning it thoroughly.



THE TRACTOR CAN HANDLE EVERY OPERATION IN WHEAT-GROWING FROM PLOWING TO THRESHING

Extracting a broken stud is hard enough when there is a bit left above the surface to afford a hold, but it sometimes happens that a bolt will break in the hole, making the work doubly arduous. The best way to extract it is to make a slot across the face of the bolt with a cold chisel, and unscrew the offending bolt with a screwdriver; if set too firmly, however, to yield to the persuasion of the screwdriver, sterner methods are necessary. It can be moved usually

certain size to unscrew a small screw. He has therefore fitted up quite a few cars by turning the screws more commonly used into thumb screws. He takes a piece of hard sheet brass of a thickness that will fit tightly into the slot of the screw. He then places the screw head with brass piece in place in the flame of his blow torch, and touches up the screw head with solder. The "thumbhead" is then trimmed up neatly, and the screw turned into place.

The Economy of Power Farming

How the Horse is Being "Passed" on the Farm

[Editor's Note:—This extract of an article by Douglas Malcolm of the I. H. C. Service Bureau, shows the tendency of the day—it shows forcibly the necessity of the general smith to grasp the motor trade—automobiles, both pleasure and truck, and the gasoline and steam tractor.]

Each new step in the development of farming marks a new alliance between the producers in industry and the producers in agriculture.

So strong has this underlying principle of business taken hold of the interests which deal directly with the farm industry, that at the request of the Commercial Men's Association, backed by the influential Agricultural Press of Omaha, sixteen of the largest oil and gasoline tractor manufacturers, and as many more plow companies, loaned the services of several hundred of their employees, and the use of forty odd engines, with even more plows, for an entire week, in order that an extensive object lesson might be given in cheaper crop production.

It was a co-operative attempt by the State authorities, the Agricultural Press and the tractor companies, to demonstrate not only their particular machines, but their ability to work together as a unit, in the promotion of better farming.

With these theories emanating from everyone interested in the matter, it naturally follows that the affair was interesting to everyone. The United States is rich in its agricultural resources. It is also extravagant in its agricultural methods. Too many land owners are willing to work without salaries, and to keep horses incapable of meeting their board bills. In the region where this demonstration was held, nature this season had been unkind. It had



suffered so severely with the drought, that the only spots of green which the eye could see, were here and there fields of that heaven-sent plant—alfalfa.

Fodder will be scarce this winter, and horsefeed will be high.

On this demonstration field were a dozen small outfits which could be bought for the price of six or seven horses, and they could easily do the work of from twelve to fifteen, whether the work consists of plowing, drilling, harvesting, hauling, logging, making roads or baling hay. They can turn over an acre, six to seven inches deep, for from 40 to 50 cents, and they can drill it for even less; they can haul the harvest in from the wheatfield or the cornfield with a speed which is rapidly solving the harvest-hand problem; they can handle the disks and drills in such a way as to turn out a seed bed that even the intensive European farmers would envy; they can, as a well-known agricultural college professor said, "perform every operation in wheat-growing, from plowing to threshing and conveying it to the market, and every operation in corn-growing but cultivating."

The difference between motor power and horse power is that when a tractor quits work its expense ends, and when a horse quits work its expense begins. A hay famine has no terrors for the power farmer.

There was no work done at Fremont that would indicate that horses were a back number, or that they should be eliminated entirely from the farm. That fate has overtaken them quickly enough in the cities. It was shown, however, that in all the branches of farm work where power and speed are essential, if we are to get our crops with less work and less time, there is a marked saving in using engines. This is seen not only in labor and time, but in the saving of expense for fuel—in other words, if the time and labor-saving elements are not considered at all, it takes a greater cash value of oats to get a definite amount of work out of horseflesh than it does to get a similar amount of work out of an engine burning kerosene.

A Shop-Made Filter

E. O. SWEET

In the overhauling of a car, and when any repairing or adjusting is

to be made to the power plant, or interior of the motor or crank case, considerable lubricating oil is usually thrown away. This waste oil if passed through a filter, will be, for all practical purposes, just as good as new oil, and there is no reason why the practical auto-repairman cannot save this oil. All he needs is a simple filter, to take the dirt and grit out of the oil. Here is how I made a simple filter, at the cost of a little time:

Take a large glass jar, an earthen crock or a tin pail (I consider the glass jar best, because then you can see just how clean your filtered oil is, but the crock or pail will work just as well), and make a cover of wood, in which cut a circular opening of good size, depending upon the diameter of the jar. Now make a cone of wire cloth to fit into this opening. The wire cloth should be of fine mesh, and held in place with a few tacks. Now make a cone of several wrappings of common manilla paper. This cone must be carefully made, to avoid tearing, and the paper must have no holes or splits. Then place the paper cone inside the wire cone, which latter simply acts as a support for the paper. When ready to filter some oil, pour it carefully into the paper cone, and allow to stand and drip. It should of course be placed where there are no extremes of temperature, as cold will retard the filtration.

It will surprise you to see what a lot of good, clean oil can be secured this way, and at practically no expense.

The Care, Repair and Operation of the Automobile—10

(With Special Reference to Overland Cars)

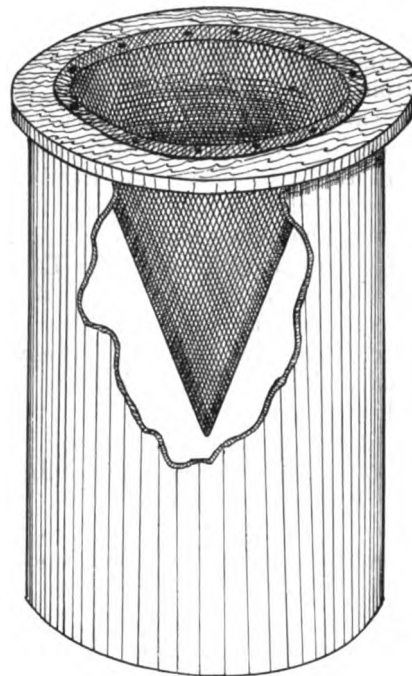
Detecting Faults

Defective Ignition.—It must first of all be ascertained whether the fault is with the magneto or the plugs; in most cases it will be found that the fault is with the plugs when one cylinder continually misfires. An exchange of the plug for a new one will remedy the fault.

Spark Plugs.—The faults generally occurring in the spark plugs are as follows:

1. Too wide gaps between the sparking points. The normal width of gap is $\frac{1}{16}$ inch; larger or smaller

gaps are detrimental to the ignition. If the gap on the plug is too wide, the spark will jump across the safety gap on the magneto, instead of across the electrodes of the plugs, provided that the plugs are screwed into the cylinders, and working under



A LOT OF GOOD CLEAN OIL
CAN BE SAVED

compression. If the spark plugs are removed, the spark will jump across, even if the electrodes are too far apart; therefore it cannot be concluded from the spark plugs which are not in the cylinders that the gap obtained is correct; a fault in this respect can only be detected if the spark plugs are fixed.

2. Sooting up the plugs. The parts exposed to the burning gas may very readily be cleaned with a brush dipped in gasoline.

If the motor will not start:

There is no gasoline in the tank.

The cock at the tank is shut off.

The gasoline pipe is clogged.

There is water in the gasoline system.

The switch is not on.

The switch is on the magneto side.

Some electrical connection is loose.

The batteries are weak or exhausted.

The contact screw in the magneto needs adjusting; (do not move this if you are not positive).

The throttle is closed.

In cold weather everything may be cold and stiff, and it may be necessary to inject a little gasoline into

each cylinder through the priming cocks which are over the exhaust valves.

If there is water in the gasoline, it may be frozen. This generally takes place in the supply pipe just at the carburetor, as this is the lowest place in the system and as water is heavier than gasoline they will not mix, and the water always finds its way to the bottom. To remedy this, pour on hot water or apply hot cloths. If poured on, be careful that none enters the carburetor. In weather at zero or below, it may be necessary to prime the motor more than once.

The motor may be flooded. That is, it has an overcharge of gasoline in proportion to the air. This is caused sometimes by a flooding carburetor, that is, the carburetor is flooding, the motor is cranked and the pistons suck up almost pure gasoline; or you are too free with the priming can. People have been known to crank a motor for hours and leave it, disgusted, for a time, and upon cranking again later on, the motor started and ran beautifully. The reason for this is obvious, the gasoline evaporated. A quick relief for flooding is to open the cocks over the exhaust valves and crank the motor, sucking in pure air and blowing out the over-rich mixture until you hear the charge fire, then you can close the cocks and invariably the motor will start.

If the motor starts and runs a

short time, and maybe pops in the carburetor on quitting, look to your gasoline. Popping in the carburetor means weak mixture, except when an intake valve is stuck.

The spark plugs may all be fouled at the same time.

If the Motor Misses at All Speeds.—One or more spark plugs may be fouled. A remedy for this is a thorough cleansing, or the installation of a new plug. If after the plug is cleaned, the cylinder still refuses to fire, find a cylinder that you know is working and put the assumed bad plug in this one and the good plug in the bad cylinder. If the trouble goes with the plug, you are sure it is the plug; if not, look elsewhere.

The carburetor may not be set right.

You may have a loose wire, which from the vibration of the machine occasionally makes a contact.

The contact screw in the magneto breaker box needs adjusting (do not adjust this unless you are sure this is where the trouble is. If you wish to try, mark it so you can put it back where it was).

One or more valves may be stuck.

The valves may need grinding.

A valve spring may be broken.

You may have a worn cam or push-rod, and a valve may not open far enough.

You may have a bad leak in the intake pipe.

If the Motor Misses at High Speed

Only.—The coil may be broken down.

The carburetor is not set right.

You have a bad spark plug.

A valve spring is weak and does not bring the valve back to its seat in time.

The contact screw in the magneto breaker box wants screwing up. A

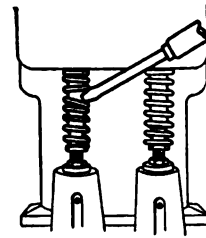


FIG. 1—TESTING THE VALVE SPRING

word of explanation on this: The motor may fire all right at lesser speeds, because the speed is slow enough and the contact is long enough to allow the coil to build up, but at high speeds, the con-

tact is too short, consequently a quarter turn of the contact screw is needed.

A valve may be about to stick, and does not come to its seat in time.

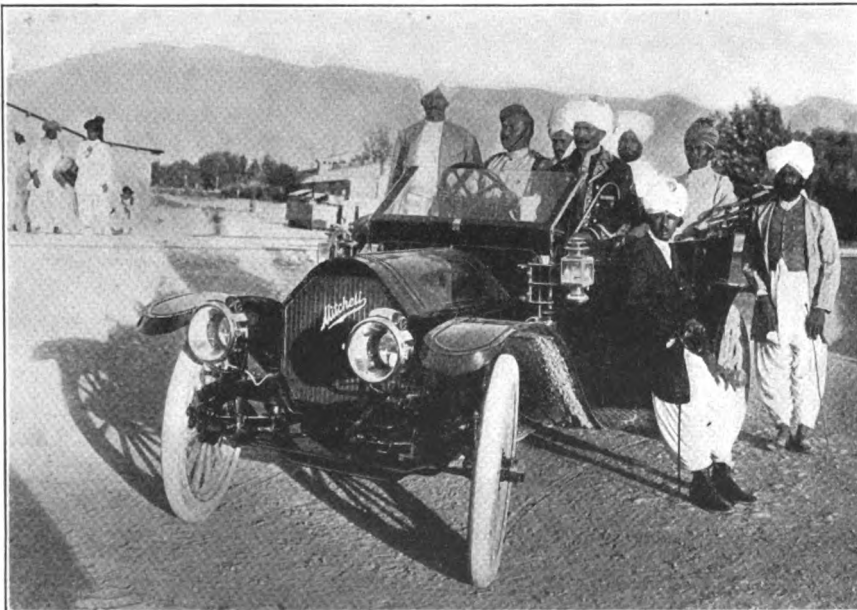
You may have a loose electrical connection, and only the high speed of the car affects this.

If the Motor Misses at Low Speed Only.—A spark plug may be fouled. It has been known that a bad plug will not cause missing at all speeds.

There may be a leak in the intake pipe. This is a very common cause for missing at low speeds, and is best detected by allowing the motor to run at the missing speed. Take a squirt can full of gasoline, and squirt around all the intake pipe joints. If you detect any difference whatsoever in the running of the motor, there is a leak. The remedy is obvious.

An exhaust spring is weak. This is found by inserting a screw-driver or other suitable tool between the coils of the spring (Fig. 1), and turning it (while the motor is running), thereby increasing the tension of the springs. If this shows you the trouble, a new spring is necessary, or if you have no new spring, remove the old one and stretch it about an inch. Replace it, and the motor will work all right. The reason of missing from a weak exhaust spring, is that when the throttle is closed, the piston cannot get much charge by, and consequently it sucks the exhaust valve open and draws back some of the burned gases, which spoils the small charge in the cylinder, thereby causing it to miss fire.

Your exhaust valves may be leaking,¹ and the foregoing is the case.



AN AMERICAN MOTOR CAR IN INDIA

Not many years ago the races represented by these Indian princes were fighting fiercely among themselves—now these princes are members of various regiments under the British flag.



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An Invitation

Are you doing things that are a bit out of the ordinary? Are you doing any work that is a little different from the regular run of smith work? Have you accomplished a difficult job? Are you using a good smith-shop business system? Then tell us all about these things. We are continually looking for good practical articles on any matters connected with smithing. We want good articles on anything and everything, from shoeing to steel working and from bookkeeping to collecting. If you have something worth saying, worth writing and worth publishing, send it in. Never mind the language used or the paper. What we want is the idea, the real meat, the bone of the bone. We'll take care to see that the matter gets into proper shape before printing; and the writers of real worth-while items and articles will find it time well spent.

Business and Accounting

The REAL reason for keeping accurate accounts is not so that you can borrow money at the bank; not so you can show a prospective purchaser how the business stands; not so you can get credit quickly and easily. Of course these are all big advantages to be considered, and are arguments in favor of accurate accounting, but the REAL reason is after all the greatest—that of business for business reasons—doing business in a business way—knowing the business and what it is doing for you. To detail all the other reasons which follow this one principal and real one would require considerable space. It is not, in these days, supposed necessary to point out the reasons for better methods when modern and better methods have shown and unquestionably demonstrated their advantages in other lines.

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Merry Christmas

THE AMERICAN BLACKSMITH—"Our Journal"—wishes you a very Merry Christmas. We extend our hand across the miles to grasp yours warmly in friendship and sincere fellowship; and may this handclasp assure you of our appreciation of your co-operation and support in our battle for a greater craft, a higher standard, a better success. What advances we have brought about in the craft are not selfishly claimed by us as ours. What changes for the better that have occurred are not pointed out as of our doing alone. But, we want you to know that without your co-operation, without your staunch support, these matters could never have been brought about. So at this season when men reflect on the past and look ahead toward the future let us wish you the Merriest Christmas you have yet seen, and may you take into your home the full appreciation of co-operative work well done. We believe that a paper is known by the men who read it and a man is known by what he reads. Our wish is that we may count you among "Our Folks" for many years to come.

One Reason

There is only one argument against your taking advantage of the long-time rates. And that is the one that very naturally comes up in every man's mind when he is asked to subscribe to a paper or magazine for any lengthy period of years. That reason is the uncertainty of life. "What if I die before my subscription runs out?" asks the man. And that is just the reason for our prorata refund if a subscriber is "called" before his long term expires. By such an arrangement the subscriber secures every advantage if he reads the paper for the full period and still reaps the full benefit of our long-time rates if his widow or heirs get a refund. That refund feature is a sort of subscription insurance. Suppose for instance, that a man subscribes for a period of ten years. He pays but five dollars (domestic rate) for that long term. Unfortunately the man dies, we will suppose, after he has received the paper for but five years. The rate for five years is three dollars. We therefore refund the difference between the cost of the term for which he subscribed and the term for which he really received the paper. In this case the man's widow or surviving heir would receive two dollars; and the advantage to the man was that he got the lowest rate for the period during which he received the paper with the possibility of a still lower rate had he lived.

So with this one objection turned into an advantage there is no reason for your not taking advantage of our long-time-rates.



TRANSPORTATION HERE IS A PROBLEM



—AND HERE NOT EVEN A THOUGHT



POOR ROADS LEAD TO CHEAP FARMS



HIGH-PRICED FARMS BORDERED BY GOOD ROADS



A ROAD IMPROPERLY CONSTRUCTED



THE SAME ROAD PROPERLY MADE



THE ROAD CONDITION PICTURED HERE SEEMS ALMOST UNBELIEVABLE

Some Poor, Some Real Bad and Some 'Good Roads



Plans for Building a Light Delivery Wagon

By COACHSMITH

THIS design is planned especially with regard to simplicity; enabling the average general shop to turn out a vehicle that will look well, stand up well, and that should sell easily to any town merchant. This simplicity in design should strongly appeal to the smaller vehicle shop man, as there is not a piece in the entire wagon (with the exception, of course, of springs and axles) that cannot be turned out nicely in the

of these vehicles it is best to turn out the different parts for all the wagons at the same time. This will enable you to work faster and with greater economy of both time and material; and after the parts are all ready the building of the vehicles can go forward without any delay.

But to return to the wagon shown in the accompanying plans—we will first take up the construction of the body part. The crosspiece A, in Fig.

shown clearly in Fig. 3, at A, and in Fig. 4 at B, B.

The bottom, which is of good, matched material, $\frac{7}{8}$ inch thick and of convenient width, is now lightly nailed to the crosspieces. The nailing is just sufficient to hold the boards and pieces together until the parts are ironed. In Fig. 1 it will be seen that the bottom boards of the wagon box extend forward beyond the front end board to form a foot rest. This

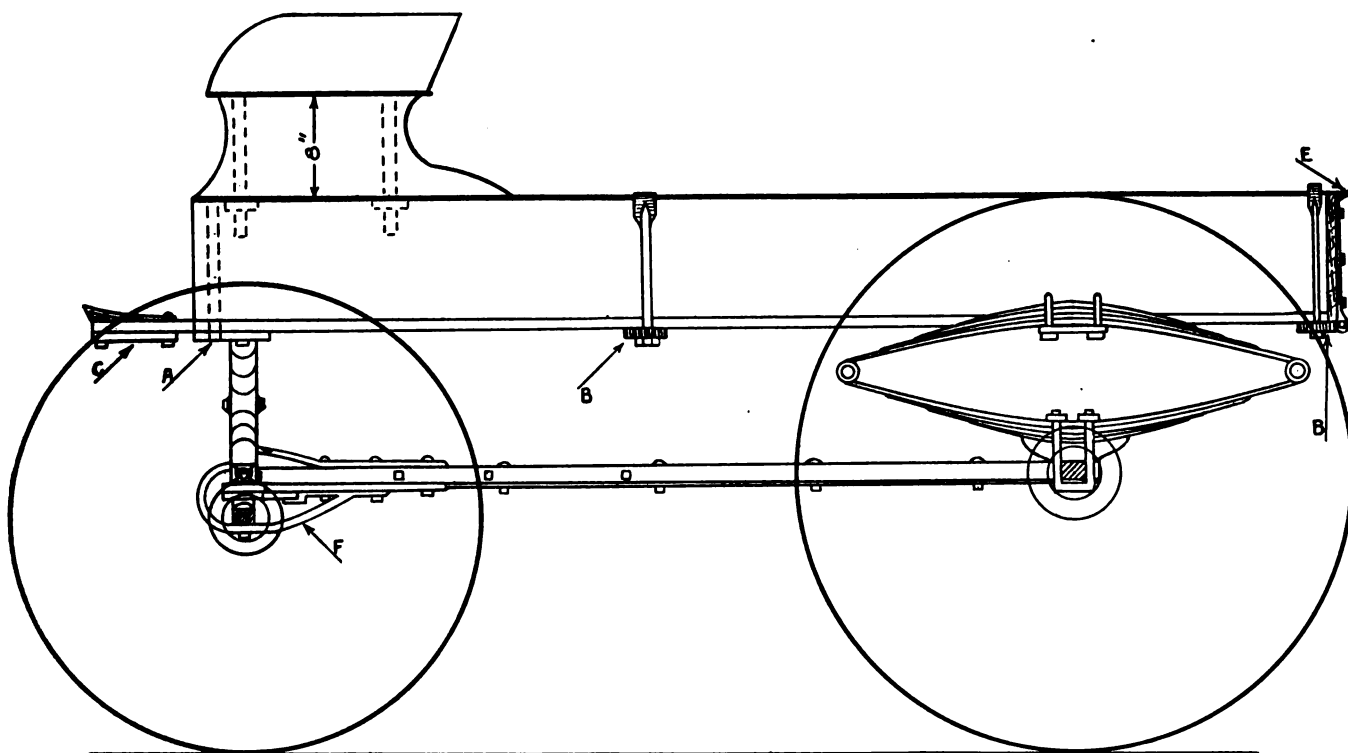


FIG. 1—A SIDE ELEVATION OF THIS LIGHT DELIVERY WAGON SHOWS ITS STRAIGHT LINES AND SIMPLE CONSTRUCTION

average general shop equipped to do woodwork. Springs and axles are usually purchased, so we might say that this wagon is entirely shop-built; and this should be a very strong argument when the finished vehicle is put on sale; or, if the builder wishes to be more certain of a sale, show this design to a possible customer or two and get orders before you build. If you make two or more

1, (which piece runs across the entire bottom of the wagon) is $2\frac{1}{2}$ by $1\frac{1}{4}$ inches. There is a mortise in each end into which the front corner posts of the box fit. The center bottom crosspiece and the rear end bottom crosspiece are now cut out. It will be observed that these pieces project beyond the side of the wagon box for about six inches and, with a brace, assist in stiffening the box. This is

foot rest or foot board is reinforced by a crosspiece C, Figs. 1 and 4, which is dressed and shaped as shown. In shaping this foot board it is well to consult the ideas of the customer. Some prefer more foot space, others less, so it is well to ask if this foot board be left square, or well curved as shown here.

The front end board is now screwed to the corner posts, and the side

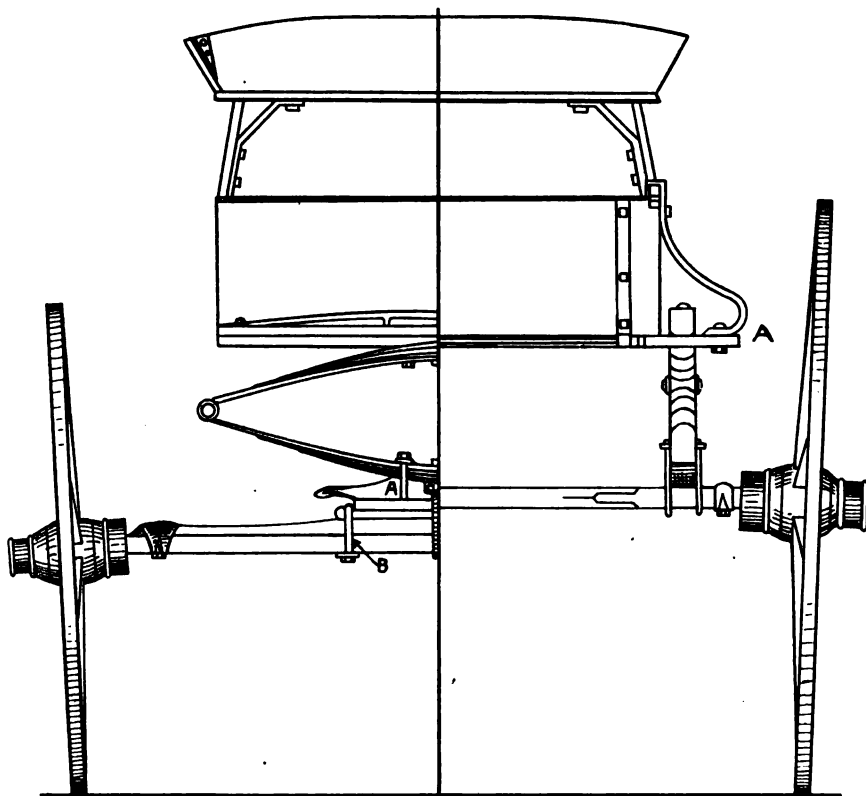


FIG. 2—A HALF FRONT ELEVATION

FIG. 3—A HALF REAR ELEVATION

boards screwed to the front corner posts and to the bottom. The tail-gate is a thoroughly sound piece of hardwood. It is hinged to the rear bottom crosspiece by means of hangers. These are made of $\frac{7}{8}$ by $\frac{1}{4}$ -inch iron. Eyebolts on the crosspiece are so placed as to allow a square-headed rod to go through each eye. This bolt is threaded at one end and held in place by a nut.

After screwing the nut on it is well to burr or rivet over the end of the rod to prevent the loss of the nut. A spring hook or catch, shown at E, Fig. 1, holds the end-gate in place and also allows for the easy dropping of the gate when necessary. The box is now ironed all around to prevent excessive wear and to strengthen, stiffen and brace all parts of it. Corner irons are fitted over the front

corners and the sides are fastened to the bottom by means of box straps riveted to the inside of the side boards and passing through the bottom crosspieces. A toe rest is bolted to the foot board. The inside bottom of the box is protected from wear by strips of 1-inch flat iron, running from the front to the rear end where they stop at an iron crosspiece which protects the bottom boards at the tail-gate. This cross iron is two or three inches wide.

The gear of this wagon is also planned on simple lines. The reach is $1\frac{1}{8}$ inches square and 5 feet 9 inches long. Then there is a head block, a front axle cap, two spring blocks and two spring bars. These make up the completed wood part of the gear.

The ironing and iron parts of the gear are very easily made. Perhaps the only part which the smith will find any way difficult is the making of the fifth wheel, though this should not cause any great trouble. The reach lining, as shown, runs the full length of the bottom of the reach and is welded to a heavier piece, forming a T-or head-block plate. This plate is made wide enough so that it can be drilled at each side of the head-block, and counter sunk. The plate is then attached to the head-block and spring by means of bolts running up through the plate as at A, Fig. 2. The bolts are then fitted with a lip yoke which is held on firmly with nuts. The lower half of the fifth wheel is a D-shaped plate

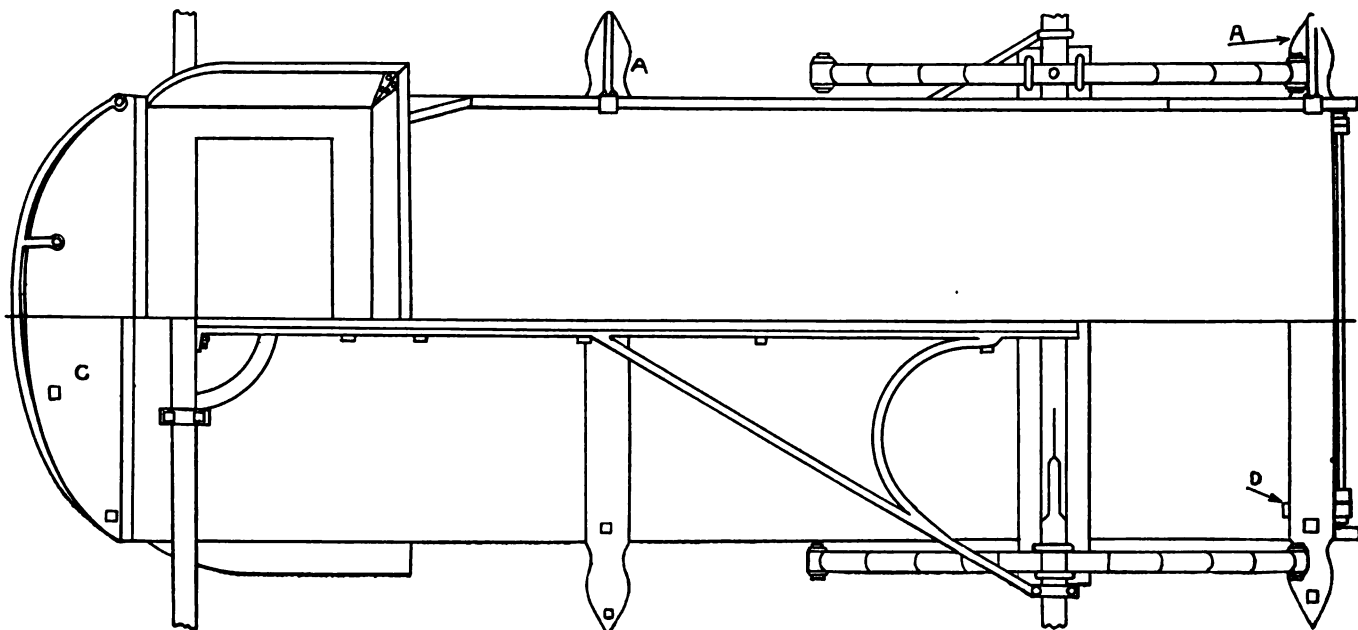
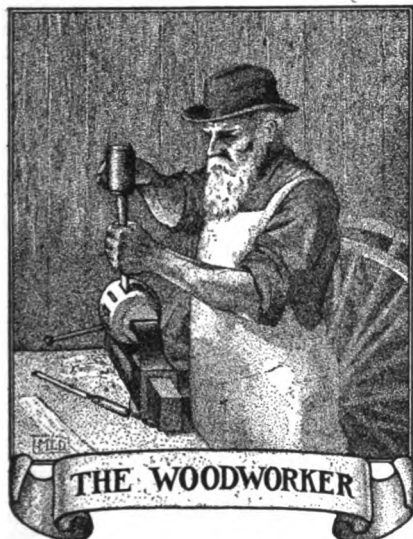


FIG. 4—PLAN VIEWS SHOWING HALF TOP PLAN AND ALSO HALF PLAN AS SEEN FROM BELOW



securely held to the front axles by means of clips—see B, Fig. 2—and on each side of the kingbolt hole by means of a countersunk head screw. The T-shaped kingbolt passes through the head-block and the axle, and also a king-bolt brace underneath the axle. This is shown very clearly at F, Fig. 1. The brace for the upper side of the front end of the reach is clearly shown in Fig. 1 and needs no explanation. The various other iron parts are also evident and easily understood. The side braces for the reach are shown clearly in Fig. 4—the half bottom plan of the vehicle.

The painting of this wagon should of course be decided by the purchaser's taste. Red for both body and gear is common, while wine color for the body and yellow for the gear and wheels has the effect of making the vehicle appear light in weight. If the wagon is for a merchant who runs other vehicles, the painting should harmonize with them.



To Prevent Glue from Cracking when used on work exposed to a dry atmosphere, use a small quantity of chloride of lime in the glue—about one quarter of an ounce of chloride of lime to a quart of glue. This will keep the glue slightly moist and thus effectively prevent cracking.

J. T. L., New York.

A Wagon Kink.—I want to tell the boys how to put a hammer strap on a common road wagon so as to prevent wearing the sandboard in two at the rear end.

Bore a hole in back end of strap large enough to take the king pin. Place the strap between the reach pole and the sandboard. This attaches rear part of wagon exactly to the doubletree where it should be and prevents any strain on the sandboard.

The strap can be made in one or two pieces as desired. If made in two pieces, the hinge should be at the end of the coupling pole.

WM. V. GIST, Tennessee.

Taking a Chance on the Charge

G. D. CRAIN, JR.

The average steady-going blacksmith, who pays no attention to the racing results, who never saw the inside of a gambling house, and seldom or never indulges in a friendly game of "draw," would probably be inclined to resent the charge that he is a gambler; but the indictment is certainly warranted in no small number of cases, by the recklessness with which prices are fixed on jobs that come into the shop.

It is natural enough, for the man with a piece of work to do on a wagon or an implement, or anything else, to want to know just about what it is going to cost him; and it is likewise very natural for the blacksmith to yield to this demand, and fix what appears to him to be a fair price, as nearly as he can tell by a hurried inspection of the job. But that does not mean that either the customer or the blacksmith is getting a square deal. Both are taking a gamble, and either may be returned the winner. This may be exciting, and interesting, but it is not businesslike.

There are few blacksmiths who have not had the disheartening experience of doing a good, honest piece of work, taking more time and more material than they anticipated, to find, when they figured things up, that the price fixed would not pay the actual cost, not to speak of a decent profit. These are the cases where the gamble has gone against the blacksmith, who, after all, is the one to be blamed for it, inasmuch as the practice could not be continued against his will.

Of course, when things go the other way, and it turns out that the charge fixed was really more than was necessary to cover the cost plus a reasonable profit, the blacksmith has nothing to regret—save, perhaps that the customer will become discontented with the price, on thinking the matter over, and decide that he has been badly used.

The point is, however, that the blacksmith should be certain of a profit on every job, instead of taking a chance with a good many, with the possibility that he will not only fail to make anything out of them, but will rather actually

lose money. It is hardly necessary to argue that no business is likely to prosper when it is run on a purely gambling basis, and that of the average blacksmith and wheelwright is no exception.

There is no doubt but that a good man can tell pretty close to what it will cost to do certain work, by an inspection of the job when it is brought into the shop, in the ordinary case. But there are a good



THE NEW GENERAL SHOP OF MR. H. K. GINN OF MAINE.

many instances where the best of judgment fails, and where it is necessary either to take a chance or to refuse to make a price. And this last has been the policy adopted by many good shops, whose owners have got down to a business basis for handling their work.

The owner of a large shop, which does a large amount of wagon repair work, came to this conclusion some time ago, after he had observed the trend of his experience with reference to going it blind in fixing prices. He found that on some classes of work it was almost the invariable rule that he lost, while on others he got a fairly even chance at a profit. He decided, however, that he would rather be sure of a profit all the time, and he changed his course accordingly.

"I didn't see any reason why I should do work at a loss, in any case," he declared. "I don't know any other business where this is the rule, and I don't know of any reason why mine should be handled that way. Take the jobs of repairing top linings, which come in pretty often. Time and again I've made fair prices on such work, only to find that one or more of the bows in the top were so badly worn that it was impossible to tack the new lining on.

"Therefore, in order to complete the job I had undertaken, I would



have to put in new bows, at a cost of several dollars; and, of course, the customer would insist on paying only the original price, in spite of the additional work rendered necessary. I could argue until I was hoarse, and few of them would admit that it was up to them to pay for the additional work.

"'You agreed to fix the wagon up for so much', is the usual argument of such a man, 'and I want you to do it.' And, of course, where I had already agreed on a price, there was nothing to do but go ahead and pocket the loss. Pocketing losses is no fun, though, and I've put a stop to it.

"Even where I found out the defect, after stripping off the old

lies in the fact that I'm legally protected in case it becomes necessary to sue for the bill—and most of the kickers know it."

On account of the difficulties which arose out of the fixing of a price before the job was taken, this blacksmith adopted a general policy of refusing to fix a price in advance, unless the customer positively insisted upon it. He was always willing to make an estimate, but this estimate, he was careful to explain, was approximate only, and the amount of the charge might be more or less, depending upon the difficulty experienced in handling the job.

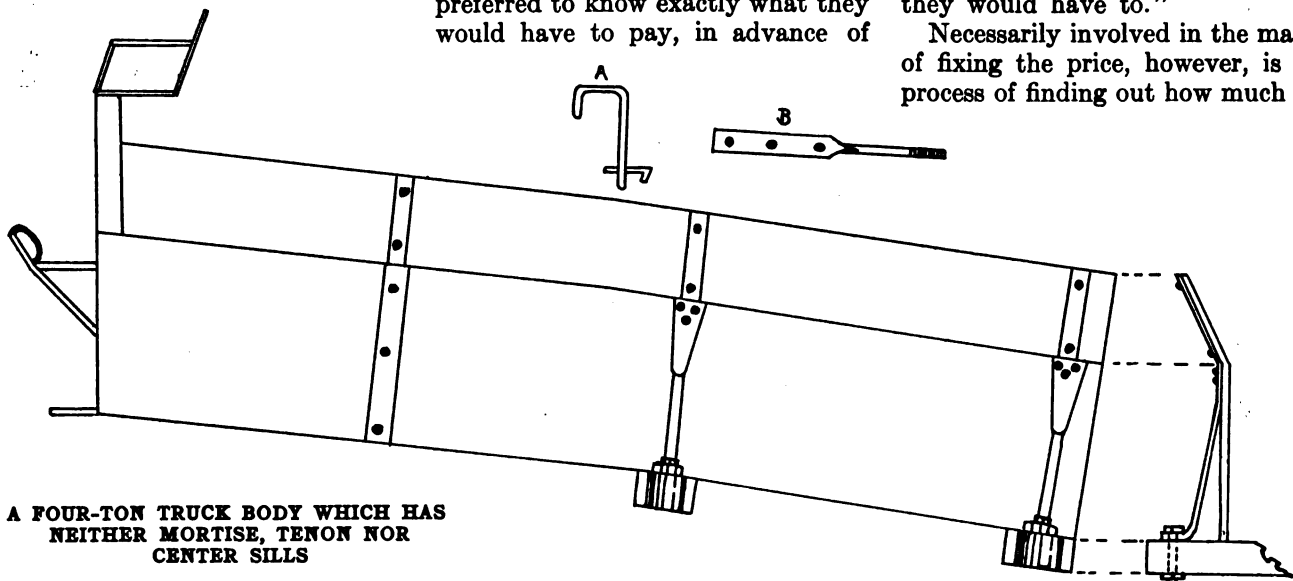
Some customers objected to this plan, on the ground that it left them open to a bill of indefinite size. They preferred to know exactly what they would have to pay, in advance of

understanding, in case the cost is higher than I think it will be.

"If he still insists upon a definite price, I tell him plainly that I can't afford to take any chances of losing; and I accordingly add just about 25 per cent to my estimate to cover unexpected difficulties, delays, etc.

"Most of my trade, however, see the point readily enough, and they trust me enough to believe that I will give them a square deal. If they didn't, probably they wouldn't do business with me. So I make my profit on every job, practically, instead of hitting a loss now and then, and being in a continual wrangle with customers who are paying more than they thought they would have to."

Necessarily involved in the matter of fixing the price, however, is the process of finding out how much the



A FOUR-TON TRUCK BODY WHICH HAS NEITHER MORTISE, TENON NOR CENTER SILLS

cloth, and pointed it out to the owner, it would do no good. The same old argument—that I had agreed to do the work for a certain fixed price—would come right back at me, and it was up to me to make good. I simply decided to knock out the fixed price, therefore, at least as far as defects which couldn't readily be seen were concerned.

"I now make it a rule to write on every estimate for a job a line or two to the effect that my bid does not include work made necessary by hidden defects not readily discoverable before the work is commenced; that such work will be charged for extra. This little provision has caught many a customer who would have been glad enough for me to do four or five dollars' worth of work for nothing. Of course, though, they kick. The value of the idea

the actual handling of the work, and even in the face of the blacksmith's warning, that he would have to make his price high enough to protect himself from possible underestimating, many such distrustful customers insisted on their point. And they would get their price—a price much higher, in many cases, than they would otherwise have had to pay.

"When I get hold of a fellow like that," said the blacksmith, "I explain to him very carefully, so that he can't make any mistake about my position, that it is very frequently impossible to tell accurately just what it is going to cost me to get the job done; that he will get the advantage of any difference between the actual cost and the tentative estimate, if the actual cost is lower, just as I expect the benefit of the

work costs the blacksmith to perform; and this is essential, whether he does all the work himself or has it done by men hired by him. If he cannot find out, with a reasonable degree of certainty, what it costs him in time and material to do the work, he is entirely in the dark as to what the price of the job should be.

The owner of the shop referred to above did not enjoy being in the dark, however, any more than he liked accepting an occasional loss, due to the work running higher than he had expected, so he devised a very simple and effective check upon this important point, which kept him informed of the cost of every piece of work which went through the shop.

This was in the form of a card, which bore at the top the name of the customer, the time when the



work was taken in, and the time when it was promised to be finished. Below this appeared a space in which to indicate the work wanted; and on the reverse of the card, space for the time taken in the smith shop and in the wood shop, and the amount of material used, appeared.

The time element was figured on this card by charging for the number of hours spent on the job, at the cost of the men's time—thirty cents an hour, say—while it was a comparatively easy matter to figure out the value of the material used, and thus to arrive at the total actual cost of the job. Adding to this the amount of profit considered reasonable, the price to be charged appeared based not on guesswork, but upon figures determined to a certainty.

This plan has enabled the up-to-date blacksmith referred to to get out of the jungle of uncertainty, and handle his business like a business man. It has saved him a good deal of worry, because he now knows that he cannot fail to make his fair profit on any job—the system won't let him fail; and, best of all, it has the crowning advantage of being easy enough to be handled by any man who can write and do simple arithmetic.

When it is so easy to do things in such a satisfactory manner, there is no real excuse for doing them in any other way, especially when the orderly and logical way is also the profitable way, and the other is almost certain to mean many losses. Any blacksmith can satisfy himself on the subject, simply by giving the plan a trial; and if he can get his customers in line, which should not be hard, his troubles on the estimate question will be settled.

A Four-Ton Truck of Simple Design

W. H. GUNN

This wagon body has neither mortise, tenon nor center sills. It is bolted together with four crossbars cut out for the sills $\frac{1}{4}$ inch deep and $2\frac{1}{2}$ inches by $5\frac{1}{2}$ inches equally placed between the other bars. Four or six straight side braces with $\frac{5}{8}$ carriage bolts and $\frac{1}{2}$ rivets.

Dimensions:—running gear—gear, 42 inches wide from center of side springs; Sells' Patent Axles, 52

inches between collars; front axle, $2\frac{1}{2}$ by 10-inch box (steel); back axle, $2\frac{5}{8}$ by 10-inch box (steel); wheels, 3 and 4 feet, $2\frac{1}{2}$ -inch tread; tires, $\frac{1}{8}$ -inch steel; hub, 12 inches; three back springs clipped under axle; the two near the wheels, 3 inches wide with 12 plates; center spring, $2\frac{1}{2}$ inches wide with 10 plates.

and a quarter, although its owners have changed a number of times during this period. The old building is still used as a general smithy, and the smith does everything in the line of iron working, from the shoeing of horses to the repairing of worn out and broken farming implements.



AN OLD NEW HAMPSHIRE SMITHY BUILT ABOUT THE TIME OF THE REVOLUTIONARY WAR

Body:—length, 12 feet inside; width, 4 feet 2 inches inside; sills, $1\frac{3}{8}$ by $4\frac{1}{2}$ inches; side panel, 1 by 15-inch pine. Hang wagon 24 inches from front of body to center of crossbar. The center bar on top gear should be 4 inches wide and $4\frac{1}{2}$ inches thick, reduced to 3 inches at the ends; $1\frac{1}{4}$ inch Norway kingbolt as at A; seat, 38 inches high from bottom; sixteen drawbolts as at B; bottom; best oak, $1\frac{1}{8}$ inch thick, level with sills; $\frac{1}{8}$ inch open between boards.

An Ancestor of Smithies

JOSEPH BERNARD PEARMAN

Among the many picturesque blacksmith shops in New England there is one in Chesterfield, New Hampshire, worthy of special attention. It was built about the time of the Revolutionary War, and no doubt within its doors were shod some of the horses of the Continental Army. Its walls which are unusually thick are constructed of granite blocks of different sizes and colors.

This blacksmith shop has been kept in actual service for a century

A student of building methods will readily recognize several of the earmarks of early American builders. One of these is the use of bricks in the stonework, the bricks being used without any particular idea of pattern. Another item of interest is the windows with small panes of glass. Still another interesting detail is the placing of what might be called a cornice of stone under the eaves and beneath the edges of the roof at the gable ends of the building.

Even in a village as old as Chesterfield there are very few if any buildings which have seen such long and continuous service and which give promise of so many more years of service yet to come.

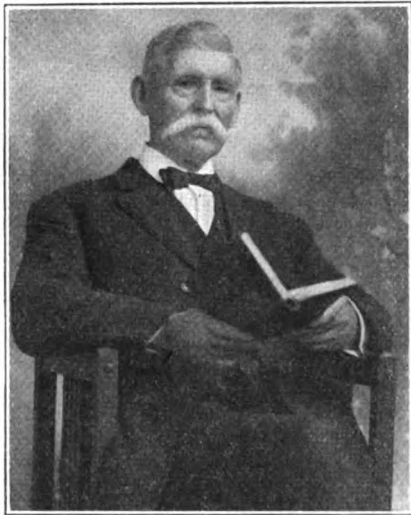
A Veteran and Still At It

JOHN BEECHER

I have worked at the trade about seventy-one years and am still working every day. I think I can shoe a horse as quickly now as any young man in the business at the present time. I began working at the trade when I was eleven years of age—working one week and attending school one week.



My grandfather ironed the first wagon that was known at that time. The tire was put on in three pieces. At that time tires were put on in sections and lapped over at each joint.



JOHN BEECHER—A VETERAN ANVIL RINGER AT EIGHTY-TWO

This wagon caused a great amount of interest and people came from far and near to see it. My uncle, Thompson Beecher, was also a blacksmith.

I worked with my father, Erastus Beecher, until I was twenty-one years old and then I entered into business for myself and am still at it.

My grandfather's name was Joseph H. Beecher, and my son Joseph H. Beecher is also a blacksmith. I will be eighty-two years old the 9th of February, 1914, and was born in Kent Plains, Conn., in 1832.

An Improved Oxy-Acetylene Welding Plant—5

ALBERT H. WAYCHOFF

Starting a Welding Shop

Many mechanics and others are anxious to start a welding shop to do welding work alone. I have while I was working in a gas plant and welding supply shop on the Pacific Coast had a number ask me why a man couldn't make good in a shop that simply did nothing but custom or job welding? I see no reason why a shop of this kind in any city of fifteen hundred or more population wouldn't make more than good.

In any city of this size and with the surrounding country to draw from there is no reason why an autogenous welding plant would not pay good profits. When you stop to

think of the amount of machinery that is being used in the factories, shops, farms and homes that is made principally of cast iron, and the amount that is broken every day, there is no reason why there shouldn't be plenty of work.

While on the Pacific Coast I worked an outfit costing over eleven hundred dollars, and it would not do any better work than my homemade twenty-five dollar one. Of course it looked better, but looks won't do the work.

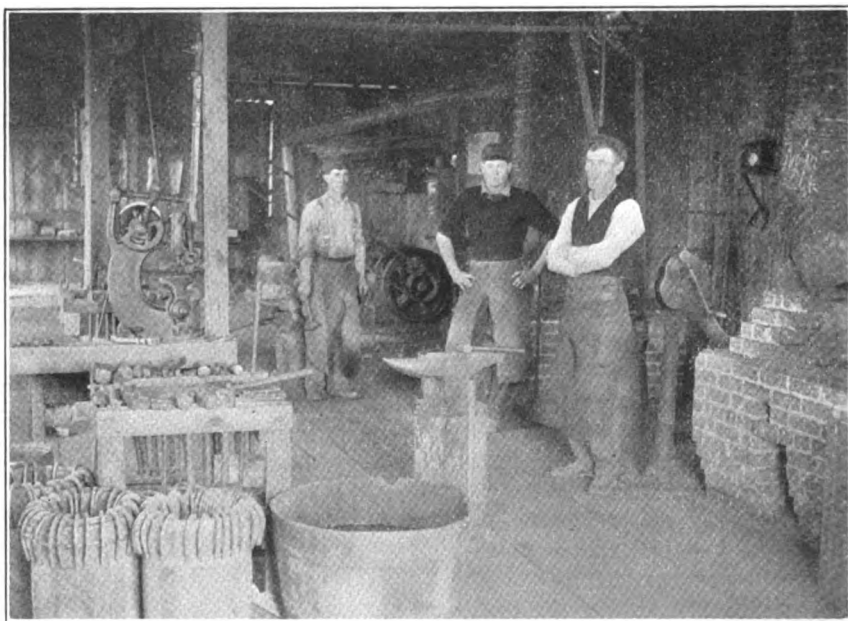
The tools necessary are the oxygen-generators, (one for cutting and one for welding), the acetylene generator, the torches (there should be several of these of different sizes), a good assortment of tips having various-sized holes, a few diamond-point chisels for cutting the V-grooves; a few stiff wire brushes for cleaning off rust where a weld is being made; a supply of good firebrick for blocking up the work so as to be handy for the operator, an assortment of various-sized clamps and a welding bench or table.

The welding bench may be of any size desired by the operator, but one about three feet wide and six feet long is about the handiest size. The most satisfactory table I have ever tried was made by building a good stiff table, using about six legs made of four-by-four-inch oak, all well bolted together, making the table as stiff and strong as possible. The top

should be of two-inch plank. Then make a fireproof slab to fit on this, of the following:—Dissolve magnesium chloride in water till the solution is strong enough to float an egg, or, if you have a heavy scale alkaline hydrometer make the solution to about twenty degrees. Then make a mould or a box of good smooth lumber the same size as you want the top of your table and a full two inches deep. Mix up a quantity of "magnesite," using the magnesium chloride solution to wet the "magnesite" with, and when mixed to a consistency where it will pour nicely, pour into the box or mould.

Allow this to harden for several days till it is perfectly dry, and your table top is ready to put on the table and use. In making the table top always mix this up and mould it in a dry place and at a temperature of at least eighty degrees if possible. While the magnesite mixture is made up and poured in the same way, its action in setting is entirely different. Instead of drying slowly, as is the case with cement, it must dry out as quickly as possible, to make a good hard stone.

This magnesite when properly made up will get as hard as any stone and will stand more heat than the best grades of firebrick. I have seen a great many tables made of firebrick, in fact, practically all of them are of either brick or cast iron, but I don't believe either of them is equal to the



THE GENERAL POWER SHOP OF C. S. CROFOOT & SON IN THE LONE STAR STATE



magnesite. It is perfectly smooth, there being no cracks in it as with a firebrick table. Magnesite is a heavy white powder, resembling plaster of paris. It is made by the calcination of a particular kind of magnesia stone which contains large quantities of carbonic acid gas. This gas is used in aerating soda pop and other beverages, so you might say that the magnesite is simply a by-product and is not very expensive.

This magnesite comes in tight packages and sacks, and should be kept in a tight container or a dry place, as it will absorb moisture from the air, spoiling its setting qualities. Magnesite is used considerably in lining blast furnaces, owing to its heat resisting qualities, and is a very desirable article to have in a welding shop.

With this equipment anyone can start up. Of course it's better to have an emery outfit and polishing wheels, yet this is not absolutely necessary. Practice with the outfit so that you can handle the various kinds of metals and know that your work will stand guaranteeing, and you are ready for business. In charging for work it is a pretty difficult proposition, and I believe the best plan I ever saw was that of the Sunset Metal Welding Co. of Los Angeles, Cal. Whenever a broken casting job came in or a crank case or other article they would find out if possible what a new one would cost and would charge from thirty to forty per cent of the value of a new one. Considering the trouble of ordering new, the cost, freight, and time required in getting new castings, this looked like a pretty good rule. They did no work at all for less than twenty-five cents. This did away with all the trouble of trying to figure out cost of gases, fluxes, feeders, time, etc., although the cost of one piece of work I saw done at this place looked rather unreasonable. A farmer brought in a large gear wheel with three cogs broken out. This wheel, new, would have cost about \$65.00. It was a very short job to weld the teeth in again, and very little gas was used, yet the job price was \$22.50, or about twenty dollars clear profit. Of course, other jobs taking almost as much time and gas, and probably only bringing in three or four dollars, would offset this profit—bringing the monthly average about right. Any-

way, be sure and charge enough.

It is hard to get at any exact cost system, there being many factors to consider, as follows. (1) The efficiency of the operator, (2) wear on the apparatus, (3) cost of making the gases, (4) amount of scaling powder

welding and clamping table which should be in every welding shop is shown in Figures 10, 11 and 12. This table is so easily and cheaply made that it can be counted almost as much of a necessity as any other part of the outfit.

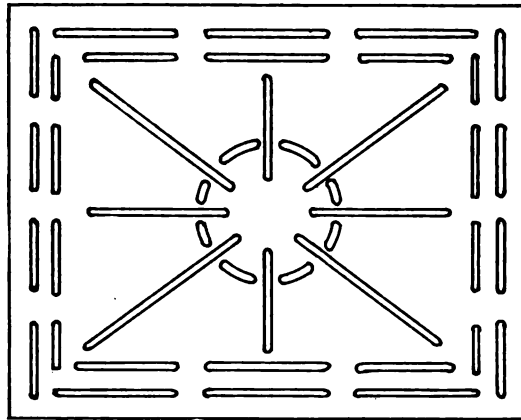
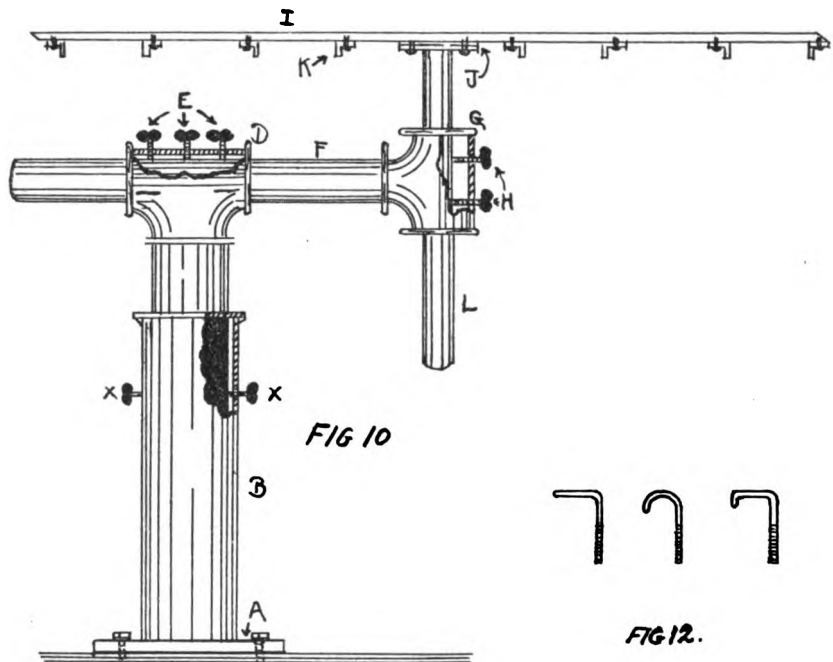


FIG 11.



AN ADJUSTABLE TABLE TO FACILITATE THE HANDLING OF
OXY-ACETYLENE WELDING JOBS

or fluxes used, (5) amount of welding rods used, and other items, make it difficult to determine. Another way of getting more expense in the work than necessary is the use of a larger tip or nozzle than is really necessary. Always use the finest or smallest size nozzle possible to do good work with.

Another very simple and handy

Referring to Fig. 10: the following materials will be required for making this table—

- 1—5-inch ordinary pipe flange coupling, A.
- 1—Piece of five-inch pipe standard, two feet long, B.
- 4—Five-eighth-inch thumbscrews, XX.
- 1—Piece of three-and-one-half-inch pipe, twenty-six inches long, C.
- 1—Three-and-one-half-inch T-fitting, D.
- 3—Five-eighth-inch thumbscrews, E.



- 1—Piece two-and-one-half-inch pipe, three feet long, F.
 1—Two-and-one-half-inch T-fitting G.
 1—Piece of one-and-one-half-inch pipe, twenty-four inches long, L.
 1—Flange coupling, J.
 1—Piece of boiler plate, two feet wide, three feet long and one quarter inch thick.

To put the table together an explanation will hardly be necessary if the engraving is observed. The pipe, C, is to allow for up-and-down adjustment of the table, while the pipe, F,

shape for welding, and at the same time they cannot possibly get away or move during the welding operation. A stationary welding table may be made of the same kind of top, but it is not nearly so handy.

Figuring the Selling Price

A. G. HOUSTON,
 of the Burroughs Adding Machine Company
 There are three elements that enter into determining the selling price of

A smith who finds at the end of the year that his returns are not satisfactory, sometimes assumes that the trouble is in one place, when as a matter of fact it is in another; sometimes he takes it for granted that the trouble is in his expense account, and immediately adopts a rigid reduction, to the detriment of his service and work, when his trouble was not there, but in the

Table for Figuring Net Profits								
Cost of Doing Business	Percentage of Increase of Selling Price over cost							
	20	25	33½	40	50	60	75	100
10%	6½	10	15	18½	23½	27½	32½	40
11%	5½	9	14	17½	22½	26½	31½	39
12%	4½	8	13	16½	21½	25½	30½	38
13%	3½	7	12	15½	20½	24½	29½	37
14%	2½	6	11	14½	19½	23½	28½	36
15%	1½	5	10	13½	18½	22½	27½	35
16%	½	4	9	12½	17½	21½	26½	34
17%	½ Loss	3	8	11½	16½	20½	25½	33
18%	1½ Loss	2	7	10½	15½	19½	24½	32
19%	2½ Loss	1	6	9½	14½	18½	23½	31
20%	3½ Loss	0	5	8½	13½	17½	22½	30
21%	4½ Loss	1 Loss	4	7½	12½	16½	21½	29
22%	5½ Loss	2 Loss	3	6½	11½	15½	20½	28
23%	6½ Loss	3 Loss	2	5½	10½	14½	19½	27
24%	7½ Loss	4 Loss	1	4½	9½	13½	18½	26
25%	8½ Loss	5 Loss	0	3½	8½	12½	17½	25

allows for the horizontal adjustment of the table. After the table is adjusted, the pipe, L, may be rotated to turn the entire work around without removing the work from the table top; thus allowing easy access to every part of the work. The top of the table should have a number of slots cut in it as shown in Fig. 11. This is a good place to try your cutting torch. Then a number of clamps, shaped like those in Fig. 12, completes the table. With one of these tables and a set of clamps it is pretty hard to find a small or irregular shaped piece of work of any kind that cannot be held in the proper

any job or article, namely, the cost of the article or the stock, percentage of operating expense and percentage of profit desired.

The cost of the stock or goods is a known element in the selling price. The other two elements, percentage of operating expense and profit, must be figured out.

This is the rock on which so many small businesses are wrecked, due to the fact that cost is used as a basis for figuring instead of selling price.

Taking a certain percentage of the cost price produces an entirely different result when applied against the selling price.

Net % Profit	Table for Finding Selling Price										
	15%	16%	17%	18%	19%	20%	21%	22%	23%	24%	25%
1	1.19	1.21	1.22	1.24	1.25	1.27	1.28	1.30	1.32	1.33	1.35
2	1.21	1.22	1.24	1.25	1.27	1.28	1.30	1.32	1.33	1.35	1.37
3	1.22	1.24	1.25	1.27	1.28	1.30	1.32	1.33	1.35	1.37	1.39
4	1.24	1.25	1.27	1.28	1.30	1.32	1.33	1.35	1.37	1.39	1.41
5	1.25	1.27	1.28	1.30	1.32	1.33	1.35	1.37	1.39	1.41	1.43
6	1.27	1.28	1.30	1.32	1.33	1.35	1.37	1.39	1.41	1.43	1.45
7	1.28	1.30	1.32	1.33	1.35	1.37	1.39	1.41	1.43	1.45	1.47
8	1.30	1.32	1.33	1.35	1.37	1.39	1.41	1.43	1.45	1.47	1.49
9	1.32	1.33	1.35	1.37	1.39	1.41	1.43	1.45	1.47	1.49	1.52
10	1.33	1.35	1.37	1.39	1.41	1.43	1.45	1.47	1.49	1.52	1.54
11	1.35	1.37	1.39	1.41	1.43	1.45	1.47	1.49	1.52	1.54	1.56
12	1.37	1.39	1.41	1.43	1.45	1.47	1.49	1.52	1.54	1.56	1.59
13	1.39	1.41	1.43	1.45	1.47	1.49	1.52	1.54	1.56	1.59	1.61
14	1.41	1.43	1.45	1.47	1.49	1.52	1.54	1.56	1.59	1.61	1.64
15	1.43	1.45	1.47	1.49	1.52	1.54	1.56	1.59	1.61	1.64	1.67
20	1.54	1.56	1.59	1.61	1.64	1.67	1.70	1.72	1.75	1.79	1.82
25	1.67	1.70	1.72	1.75	1.79	1.82	1.85	1.89	1.92	1.96	2.00
30	1.82	1.85	1.89	1.92	1.96	2.00	2.04	2.08	2.13	2.17	2.22
35	2.00	2.04	2.08	2.13	2.17	2.22	2.27	2.33	2.38	2.44	2.50
40	2.22	2.27	2.33	2.38	2.44	2.50	2.57	2.64	2.71	2.79	2.87
50	2.86	2.94	3.03	3.13	3.23	3.33	3.45	3.57	3.70	3.85	4.00

fact that his average gross profits were not sufficient to cover the cost of doing business, no matter how careful he might be.

A Common Error

Many smiths make the mistake of adding to the cost of the goods a certain percentage to cover operating expense and profit, and using the result as a selling price. Yet in figuring their profits for a given period they expect to realize the same percentage of profit on the sales that they added to the cost. Is it any wonder that they are surprised at the results which show that they are making less than they think they are?



To illustrate this point, let us take a business, for example, in which the operating expense is 22 per cent and the profit desired 10 per cent. Take an article that cost \$1.00, add 22 per cent, or 22 cents, as a cost of doing business, and then 10 cents profit, making the selling price \$1.32. In arriving at the percentage of operating expense, the

\$1.32, leaves just 3 cents profit. Therefore, instead of realizing 10 per cent profit, as anticipated, the actual profit is only $2\frac{1}{4}$ per cent.

The Right Way to Figure It

The right way to have figured the selling price on this article is as follows:

The selling price is made up of the cost of the article, the cost of doing business, and the profit, and repre-

of the selling price is \$1.00, then the whole selling price is 100 divided by 68, or \$1.47. Therefore, to make 10 per cent profit on a dollar article it must be sold for \$1.47 and not \$1.32.

In this illustration we have shown the right way and the wrong way of figuring the selling price, using the example just quoted.

Table for Finding Selling Price

As a means of easily determining the selling price when the percentage of operating expense and profit desired is known, the table illustrated herewith can be used to good advantage. The percentage of operating expense is shown across the top of the page and the percentage of net profit shown down the left hand side.

In finding the selling price of the above article, first locate the 22 per cent at the top of the page, and then read down this column until opposite the 10 per cent at the side; the selling price for an article that costs \$1.00 is then shown in the table. In this case it is \$1.47. If the article costs \$3.50, multiply \$1.47 by \$3.50, and arrive at a selling price of \$5.15.

Table for Figuring Net Profits

The other table shows what your net profit really is when you increase the cost price by a certain percentage.

For example, if you increase your cost price 25 per cent and your cost of doing business is 15 per cent in the column headed "25" opposite the 15 per cent at the left hand side of table appears the figure 5. This shows that by increasing the cost price 25 per cent and with an operating expense of 15 per cent a net profit of 5 per cent can be realized.



THE ART SMITH—MR. JAMES CRAN—DEMONSTRATING HIS ABILITY TO MAKE ROSES OF IRON TO SOME YOUTHFUL ADMIRERS

sales are used as a basis of calculation; therefore, the cost of doing business, 22 per cent, is figured on the selling price.

In this case, 22 per cent of the selling price, \$1.32, is 29 cents. The cost of the article is \$1.00, and adding to this 29 cents for operating expense gives a total of \$1.29 which, subtracted from the selling price,

sents 100 per cent. The cost of doing business is 22 per cent and the profit is 10 per cent, which, added together, amounts to 32 per cent.

Since the selling price is represented by 100 per cent, and the cost of doing business and the profit amount to 32 per cent, the balance of 68 per cent must represent the cost of the article, or \$1.00. If 68 per cent

Thoughts on Timely Topics

By THORNTON

Caustic Censure and Cheery Comment

"YOU DON'T BELIEVE IN SIGNS, Do You?" questioned a shop-owner the other day when we lit into him for the appearance of his shop and its likeness, at least on the outside, to an old-fashioned crazy quilt with yellow and bright red predominating. I really think the impressionist school of painting got its start decorating smith-shops and barns. The average country barn of a Cheap-John farmer, who'd rather have some cheap medicine paint (or is it the medicine itself that they use?) to cover up the



nakedness and add to the unsightliness of his place, has got Rembrandt and the whole painting school of France lashed to a frazzle when it comes to the mixing of colors; and that same kind of a barn has nothing on some smith-shops. Talk about

smith. Not so fast, brother. I don't say that a smith can don a white serge suit and keep it white for even two shakes of a Missouri mule's hind foot—but it's not necessary to go around looking like a boilercleaner all day. I know a

wasn't anxious to sell. It must be pleasant for a woman, while she's currying her fingers on a ridged piece of zinc and putting kinks in her back that would make a coon's top-knot blush with envy, to picture her husband in his shop, shifting belts on his power hammer and tuning up his gas engine. That smith in Ohio has got the right idea, to my way of thinking, and I hope that the Editor's little spiel on the matter will encourage a limitless imitation of that smith's example.

A WORD ON A MATTER that I've been thinking about for some time. Not that we are entitled to a swelled thinking apparatus nor that we can justly claim a larger sized hat, but it is well to consider this matter. And the matter thus introduced is the smith of today compared with the smith of ten and even five years ago. Ten years ago the average smith knew few papers, and read little outside of his own local newspaper with an occasional glance at a trade paper. He really thought that all he need and should know was something about local affairs and just enough about his trade to be able to do his work from day to day. As far as real business methods went, the smith knew about as much of them as a poor man does of champagne suppers—by rumor and hearsay. Ten years ago it was about as hard to find a real business system in a smith-shop as it is to find a thread of wool in a bargain-day suit of clothes. Business systems were about as numerous in the rank and file of smith-shops as oysters are in a chop-house stew. And even five years ago, while the craft as a whole was on the up-grade, it had just about gotten under way. I can remember an incident that happened about five years ago that will come pretty close to showing the true condition at that time. I was visiting down Indiana way, and one day called on the smiths in the town. I was exchanging experiences with one man who ran a fair-sized place with two helpers. "Do you carry much on your books?" I asked, edging 'round to the subject of business methods. "No," said this modern Napoleon of business. "I do not—in fact I don't have any books to put anything on." "Oh! then you do a strictly cash business?" I put in quickly. "No, I do some credit



ON THE WAY TO THE MILL. IN THE NORTH WOODS

your Futurists and Cubists and all the other "ists" that aren't artists at all—why the sign-bedecked, color-covered smithy has them backed off the boards. But perhaps some smiths are such ardent followers of these modern "ists" and are such staunch believers in modernism (which we poor, ignorant souls cannot get through our cast-iron, copper-domed intellect) that they want to live right in and with their hobby. However it may be, we still prefer the neat, modestly painted smithy with a neat, dignified, easily-read sign that tells what it means in clear, clean, straightforward lettering.

AND WHILE ON THIS SUBJECT OF APPEARANCES, let's touch just lightly with our 20-pound sledge on the appearance of the smith. Did you ever notice—the average smith thinks he's got to look just like the average person thinks the smith has got to look; and that is like a man who has just crawled down a chimney in an attempt to make his children believe that there is really some truth to that old talk about St. Nick. And if you have ever cleaned out a chimney that has not even been looked into for several years before your greatgrandfather was born you know that the job of old Santa Claus was well "sooted" for the average black-

smith not more than a mile away who solved this puzzle of appearances by wearing a clean pair of overalls and a jumper each day. His wife says it's easier to wash out slightly soiled garments often than to try to get extremely dirty garments half clean; and if your wife has the help of a washing machine you'll find her more willing to help you in this matter of better and more business-like appearance.

AGAIN WE HAVE RUN INTO ANOTHER SUBJECT—that to which Our Editor referred in the September issue—that washing machine story of his was one after our own heart and it made us feel just like going out to find the smith in question and shake him by the hand. How can any man with any conscience at all buy every new-fangled contraption built for smith-shop equipment, from a self-starting, high-speed, streamline power hammer with phonographic attachment, to a self-oiling, electrically-lighted, turkish-cushioned gasoline engine, and allow his wife to play tag with his mercerized shirt on a corrugated board every wash day? One would be inclined to believe that gasoline engines were sold regularly for \$8.33, and that washing machines were controlled by a trust that put up the price to \$125, and even then



here, but you see it don't amount to a great deal and I can generally carry it in my head." Can you imagine, brother, carrying credits in your head? Why it's hard enough to carry them on your books. But I'm glad to see that this has all pretty much changed. Glad to see smiths using real systems. Glad to see the craft mounting the up-grade at an increasingly faster gait. Glad to see that the average smith today is better off financially, intellectually and commercially than he was even five years ago. The craft is advancing, brother, and I hope every one of us will get into the band wagon and be right up at the head of the procession for the rest of the way. Let us be up and doing. Let us be on the alert to appropriate the good methods, the better practices and the progressive ideas of modern business. Let us read more, study more, think more. Let us expand beyond the confines of our localities and know more about things that are not directly related to our lives and our business. We have advanced wonderfully in the past ten years and have increased the pace during the last five years. Now, let us all strive toward higher speed along the road toward idealism.

Cement Flooring

JAMES CRAN

Cement flooring has been the subject of discussion for some time. The short article in the October issue, by Mr. H. N. Pope, has led the writer to believe that his experience with nearly all kinds of floors in blacksmith shops may be of interest to some of the readers. The writer has been up against all kinds, from the common dirt variety to the best grade of maple. Personally, I think the cement floor is about the worst that can be had for a blacksmith shop. It has no resiliency and it is not only hard on the feet and legs but very bad for shoes. Flagstones are very similar; bricks but a slight improvement; and wood, although the most comfortable of all, does not fill the bill on account of its inflammable nature.

For a comfortable, inexpensive floor for a blacksmith shop, earth, or dirt as it is commonly called, with wooden platforms on either side of the anvils and in front of benches

is hard to beat. It gives to the workmen all the comforts of a wooden floor, and still there is plenty of room on the earth portions to lay hot stock and forgings.

What would seem to be an ideal flooring for blacksmith shops is a composition that has come into the market in the last seven or eight years. Its principal ingredient is magnesium chloride. To this is added certain dry powders. It is laid plastic in one or two coats about $\frac{1}{2}$ inch in thickness. It dries in a few hours into a lightweight, fireproof, waterproof, seamless, tough, resilient mass which feels to the feet like high-grade linoleum. From seven to eight years' wear on floors of this kind shows no perceptible difference, and it is believed that once laid it is good for at least one hundred years. The fact that it can be heated to 1700° F., cooled in water and reheated, would seem to indicate that it is an ideal flooring for blacksmith shops. Its cost, compared with maple flooring, is about double.



Benton Passes Out a Few Recipes

"Well, Benton, what's on your mind?" questioned the Editor as the recipe man sank into his accustomed seat.

"I just came across a recipe," began Benton helping himself to a cigar, "that I thought you'd want to pass along just about this time."

"What is it? Some secret method of making two dollars of a Christmas allowance go as far as three ordinary dollars?" laughed the Editor.

"No, this is no secret or mysterious affair at all." And Benton began turning the leaves of his note book until he came to a page where a slip of paper had been placed to indicate some particular notation. "No, this is merely another anti-freezing solution for gas engine cylinders. Your readers will be rather glad to get some hint along this line about now."

"Well, let us have it," returned the Editor.

"This solution will prevent the freezing of the water for all temperatures down to 20 degrees below zero. It consists of 75 parts of carbonate potash and 50 parts of glycerine added to 100 parts of water by weight."

"That is of interest to our readers at this season," returned the Editor. "Anything else new to hand out?"

"Yes, it's just a simple thing, but one that may come in handy almost any time. I was down to the big plant of the Corson-Parke Company the other day looking for Charley Robbins. After going all through his department, I found him busy with a half dozen men repairing some steam pipe line that had mussed up things pretty badly. I got there just in time to see them putting in the new piping. I noticed that before screwing the joints together the men applied some substance that looked neither like red nor white lead. And when I asked Charley what they were using he told me it was varnish. That was a new one on me. He explained that it was good for either steam or air joints and that it dried hard in the joint."

"That is a new stunt to me, too, Benton. It is a good thing to know in an emergency, when red lead might not be—"

The Editor was interrupted at this point by the entrance of Tom Kane. Tom had a small coil spring in his hand which he explained to Benton was one of quite a number that he was continually called up to temper for his company. "I can't seem to get them right," went on Kane. "The springs don't stand up as they should. You see they operate the throw levers on the big machines at the plant, and while they are working steadily all day long there is really no heavy strain on them. Can you give me any help, Benton?"

"I think I've got just the information you want," returned Benton. "While down visiting Al. Gage some weeks ago he explained how they temper their coil springs at their plant. I believe I've got it down here in this book," and Benton began to hunt through the pages of his recipe book. "Ah! here it is," and then he read the following: "First prepare a barrel of fish-oil by adding ten quarts of rosin and twelve quarts of tallow. This is the quenching bath. Also make a handler for the springs by forging a star-shaped five-or-six-armed piece and weld a rod to its center as a handle. Now heat your springs carefully and quench in the prepared oil. After quenching in oil the springs are drawn to a reddish purple in melted lead, the springs being placed on the star-shaped handle and lowered into a pot of lead until of the proper color. If the springs break, because of being too hard, add more tallow to the fish oil. If, however, the springs appear brittle, add some yellow beeswax—a ball about six inches in diameter is sufficient. That," ended Benton, closing his book, "seems a rather complicated process, but if it gives you the desired results, it will be well worth the time and trouble. Try the thing out on a small scale, Tom, and then if it works right on your particular springs you can put in larger equipment."

"Yes, that's a good idea, Benton," agreed Kane. "I'll try it out with a small quantity first. Of course we use fish oil in the hardening of some of our machine parts, so it won't cost much to test the method on our springs." And with a hearty "thank-you," Tom Kane went out.



Is There a Santa Claus?

W. O. B.

(An Answer to a Child's Question)

*Is there a Santa, you ask if he's real?
A being alive, a person to feel?
Or is he a phantom, a hazelike unknown,
A spirit from dreamland in minds yet
ungrown?*

* * * *

Yes, child, there's a Santa, he's real and he lives.

Just as real as the love in your life.
As real as the comfort your good mother gives,
Just as sure as her help in youth's strife.

He's real as devotion, affection and joy,
As real as is beauty and grace;
For without human tenderness hate would destroy
The dimples and smiles on your face.

How dreary, how cold would this world be for you
If no Santa Claus came with his toys;
As dreary as if there were no Bettys to
Teach grown folks again of youth's joys.

For without childlike faith in things yet unseen
What would come of poetic ideals,
Of romance, of fancy that frown on things mean,
And to our best selves make appeals.

* * * *

*Is there a Santa? Are these things all real?
Are they not something unseen yet to feel?
Ah! child, there is nothing in this world as true.
So let Santa Claus mean these things to you.*



"Time and tide wait for no man." But there are many who wait for time and tide.

Are you ready to grasp opportunity when it comes your way? It may be passing now—are you ready?

When you're stuck on a job, or stuck on your job, just turn over the pages of "Our Journal."

And while on this cost-accounting matter, remember that a job done well in the first place, costs least in the long run.

Don't forget, Mr. Business Smith, it takes two to pull off a real successful smile. Think it over.

J. P. Morgan once said: "The man who does not advertise will soon have the sheriff doing it for him."

How can we make this paper still more valuable to you? Let us know. We want you to help us be of more help to you.

"Nobody'll trouble t' dispute y' if y' think an' say y' can't," says Cuff Brasher. "But somehow folks'll take y' at yer word when y' say an' believe that y' kan."

"A successful man is one who does the next thing next," answered a highly successful business man when asked his real recipe for success.

Out of Boston comes the news that more business is being done in horseshoeing in the City of Culture than ever before. Good! Now who's next?

One smith we know says his discounts pay for lights, telephone, postage, office stationery and the occasional business cigar that he hands out. What do your discounts pay for? Write and tell us.

"Never too late to mend," quoted the shop visitor viewing the general neglect of the place. "Then, why start now?" asked Tom, aptly living up to the family name of Tardy.

Are you going ahead? If not, then you must be going backward. You cannot stand still. It must be one way or the other. Now is a good time to stand back and look at yourself.

Doing more work while there is work to do is like taking a bun while they're being passed. Better have tools and shop in readiness to take care of more work when it comes your way.

Of all the people in your town or locality, how many are there that you want as customers? Pick them out—call on them—talk to them. For how can you sell them your services if you don't tell them of your service?

A smith we called on the other day seemed so afraid he wouldn't hear the "quittin' whistle" blow, that he stopped work every little while to listen. His name? Well, his initials are T. T. and his first name is neither Dick nor Harry.

Going to let that pile of old tires, wheels, running gears, and what-not, go through another winter? Better clean up that stuff now—you'll find it easier than next spring. And that's not saying a word about the appearance of the shop and surroundings.

Some smiths need to extend credit—BUT—they do not need to extend credit in an unbusinesslike manner. There is no excuse for not investigating a customer's record, and also none for extending him credit when his record is poor. Do business on a business basis.

One man we know would sooner pay two dollars for a little bottle of some faker's so called welding fluid or plating powder, than he would pay one dollar for twelve issues of a trade paper that will tell him more about welding, plating, and a hundred and one other things, than the money-grasping faker will ever know.

What relationship are your overhead expenses to your selling prices? Do they know each other at all? Some smiths seem to think that these two business items should be entire strangers to each other. Better read the business articles and get this matter of correct accounting straight in your mind and business.

"A little and often soon fills the purse." Steer clear of speculation and get-rich-quick schemes. Be content, rather, to save a little and often. Put it into a good strong bank to draw interest and to work for you while you continue to work for yourself. A certain, moderate but sure income is infinitely better than the possibility of great returns with probability of great loss.

The crisp, bracing days of do are here. What are you planning? What new ideas are you working out? Is the brisk, nipping winter weather filling you with renewed spirit and greater ambition or does it merely emphasize your inclination to hug the stove closer and to sit tighter upon old, accustomed ways? Better cross-question yourself on these matters.

The Subscriber's Service Department will sell you craft books; binders for "Our Journal"; send you book lists on any subject; sell you electrotypes and cuts for business stationery and advertising matter; will print your letter heads, envelopes, circulars, bill heads, and do your buying in stock and machines. Ask the Subscriber's Service.

What are the business articles doing for you? Are you getting all you should out of them? Are you profiting by the examples, by the suggestions, by the advice? A good many of our folks are putting in real systems. They are anxious to "know." A guess is usually a miss, and a miss, when profits are the bull's eye, is poor business shooting. Better get a system that will make your aim sure and true.

A hatter doesn't buy new hat styles simply to cover heads. Nor does a dress-maker plan new designs merely to cover nakedness. Any old hat will cover a head—any old sack from a kimona to a rainproof will cover nakedness. New styles are created to make sales and to increase profits. Can you apply a little of that idea in your business? How about new devices for the farmer, new wagon designs for the merchant, new items of equipment for the horseowner?

Did ever a horse so decline in value? The recent sale of an automobile within a few doors of "Our Journal" offices will interest a great many of "Our Folks." The automobile in question was one that was very popular a few years ago. The complete car with an extra body, extra tires, full complement of lamps, etc., cost originally \$6,500 when new. Said to have been run but one season it was placed up on "Dutch Auction." The pricing started at \$4,000 and was reduced each day until the figure \$825 was reached when it was sold—at 1/8 its original cost. Again we ask, did man's most faithful friend ever so decline in value—and after one season's usage?

In Germany, acetylene has been used in the form of an explosive for blasting. Carbide of calcium in small particles is enclosed in a tin cartridge, the upper part of which contains water separated from the carbide by a partition. At the top of the cartridge is an electric percussion device. An iron pin, worked from outside the cartridge, perforates the partition and allows the water to come in contact with the carbide. This is effected by a blow five minutes before it is desired to cause an explosion. At the end of that time, sufficient gas having been developed in the cartridge, the electric spark is fired and the explosion occurs. The effect in blasting is said to be the rending of the rock with innumerable cracks, so that the fragments are easily removed.



Our Honor Roll

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Case-Hardening

C. A. SENSENBACH

Factors governing case-hardening, are: one, equipment; two, temperature; three, time; and four, the nature of material.

I have placed equipment first, as I do not believe it is possible to get good results with a slipshod equipment, and in this respect some of the railroad shops are badly in need. I believe I am correct in stating that 75% of the railroad shops are not equipped with pyrometers; and how is a case-hardener to know positively that he is maintaining an even temperature, which is so essential to good work, without a pyrometer. There is no case-hardener that can judge a heat within 50°, after it has passed 1500° F. The daylight each day is different, also a man's eyes differ, from day to day.

Temperature:

This is one of the important factors governing case-hardening, and good results cannot be obtained unless the temperature is even. If the heat is allowed to go below 1300° F., the carbonizing stops, and decarbonizing is liable to take place; and if the heat is allowed to go as high as 1850° F., there is a tendency to crystallize the metal; and it is an accepted fact that a good penetration and good depth cannot be obtained with an uneven temperature. I have found the heat from 1500° to 1650° F., to give good results, of course depending on the material used, but this must be maintained at that point, or the results will not be good and will show an uneven case after the re-

heating; and an even temperature to be maintained, brings us again to factor No. 1, namely, equipment.

Time:

The length of time, pieces should be left in the furnace, depends largely on the size of the pieces and the size of the boxes. Where small pieces are to be carbonized, small boxes should be used, on account of the excessive time it takes to heat large boxes through. The time of carbonizing, should be taken from the time the furnace reaches the carbonizing heat, and not at the time the boxes are placed in the furnace, as it is seldom furnaces are heated in the same amount of time every time they are started. Of course this applies only to furnaces that are not run regularly. Where furnaces are run continually, the method of taking the time from the time the furnace is charged, can be used.

On small pieces, I have obtained $\frac{1}{8}$ inch case in five hours, (carbonizing time). On large pieces, such as links, cross-head pins, etc., I have found it necessary to run as long as sixteen hours, (carbonizing time). I think with the proper equipment a regular chart could be tabulated.

Material:

This factor is a delicate one, and the source of considerable argument;



FIG. 1—DIAGRAM SHOWING PRINCIPLE UPON WHICH THE PLOW SHARPENER OPERATES

and I believe there are as many combinations of materials used, as there are railroad shops.

The old style of material was raw bone, and I have had some fair results with bone, but my principal objection is the tendency to pit and scale the pieces, caused by the excess of moisture and sulphur in the bone, and also it seems impossible to get two batches alike. I also strongly object to the use of any cyanide preparation, on account of the poisonous fumes, and I do not think it right that any worker should be put in a dangerous position, when it is not absolutely necessary.

I have obtained excellent results with hydro-carbonated bone black

and prefer it to raw bone, as I have found it more uniform, which is very essential, and have been able to use it over, several times. I have also been able to get a good depth of case in a reasonable time, and unless you have a material that will liberate the carbon gases freely, you cannot expect, nor will you be able, to carbonize your pieces in a reasonable length of time.

There are several preparations for case-hardening, that the makers claim can be used on the forge, and in fact I am at the present time using one for emergency work, but I have not found one that will give a depth of case like the regular pack-hardening.

A Practical Plow and Disc Sharpener

A. C. GOUGH

The accompanying engravings illustrate one of a very large number of

designs worked out for plow and disc sharpeners. In this work a twofold difficulty has been encountered; namely, that of designing a gear which will produce approximately a straight line during the working stroke with ample clearance upon the return forward stroke, and that of adapting a design of this nature to be built in the general repair shop.

When the swaging roll produces approximately a straight line it does not require a large amount of care and skill to handle the work. A further advantage being that a short stroke may be used which renders an extra heavy flywheel unnecessary. The diagram, Fig. 1, illustrates the principle of the gear used in this

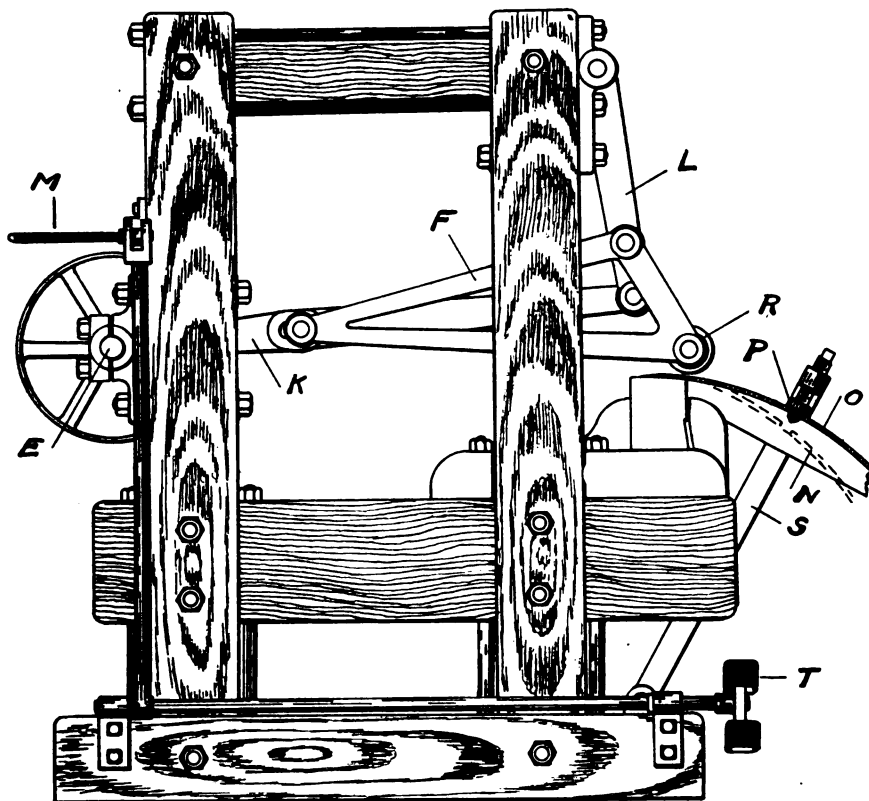


FIG. 2—SHOWING SIDE VIEW OF THE MACHINE WITH DISC IN PLACE FOR SHARPENING

machine; L being the swinging vertical arm, F the triangular frame, K the connecting rod and E the crank. The first, second, third and fourth positions are shown successively by the full lines, dashed lines, dotted lines, and broken lines. The lower part of the curve, A, B and C, represents the path of travel upon the backward or working stroke, while the upper part of the curve, C, D and A, represents the path of travel during the return stroke. As may readily be seen in connection with Fig. 2 this principle incorporated in a machine furnishes a most splendid means of sharpening plows and discs.

The belt shifter, M, is of convenient form which may be moved in either direction by means of the foot lever, T. The engraving includes an arrangement which may be found of great help when handling large discs, and this may be used as follows: A section of the disc being heated it may be placed in the lowered position shown by the dotted lines, N, then being raised until the pin, P, enters the center hole of the disc, O, when the disc may be turned through the necessary angle to bring the heated part under the roller. The disc may be manipulated in this

position by the hands or by means of a special pair of tongs. The pin, P, is supported by an arm, S, which may be clamped in any position by the lever nut, J, Fig. 3.

When pulleys, W, are made large and heavy, provision for a flywheel is not necessary. As may be readily seen, the frame is pulled together in one direction by the strain, rather than apart; however, a structure which requires the rigidity of this

cannot be too well framed nor too well secured with heavy rods. As shown here, the parts of the gear are to be heavy forgings, though they may be castings when the shop equipment includes a foundry.

Welding and Tempering Springs

W. H. GUNN

The best way to prepare a spring for welding is to upset the ends slightly, punch a small hole in the center and split out the ends $\frac{1}{4}$ or $\frac{3}{8}$ inch long. Then fuller down the scarfs thin on the inside, bending both ends of the scarfs off so that they will dovetail into each other, and hammer down flat at first and then on the edge. The scarfs will draw together and the broken parts will be held tightly by stretching the outside scarfs with the hammer.

The fire should be small and clean, the heat slow, and a very little borax or clean sand may be sprinkled on as the heat begins to rise. When your heat is high enough to fuse, take it to the anvil and tap lightly several times before the sledge is used. Keep spring full in stock and set about $\frac{1}{4}$ inch between plates.

To temper springs: Heat to a black hot, and cool in the air until oil will just blaze. Keep adding oil until blaze has disappeared; allow spring to cool, and you have a perfect job.

To temper locomotive springs: Heat to a red that can only be seen in a dark place. Have a vat of any

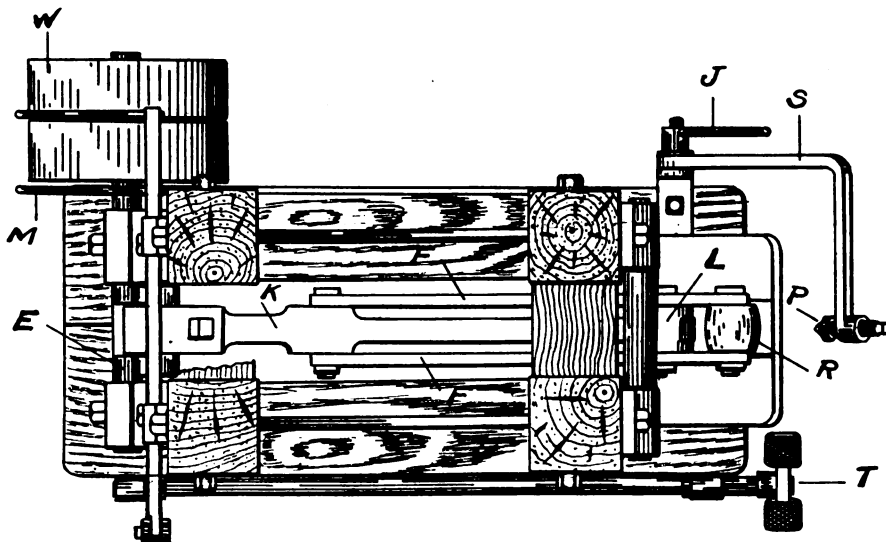


FIG. 3—PLAN VIEW OF SHARPENER, SHOWING HEAVY CONSTRUCTION OF FRAME



ordinary oil ready on the ground, and dip spring in edgewise for about eight or ten seconds and then allow to cool off.

Self-Supporting Swages and a Steam-Hammer Fixture

JAMES CRAN

The writer was very much interested in Mr. Hillyer's article on self-supporting swages for the steam hammer, which appeared in the September issue of *THE AMERICAN BLACKSMITH*. Like everything else that Mr. Hillyer writes, his swages

so that other work could be done. This advantage is readily seen by referring to the accompanying engraving.

A fixture of this kind, however, is much more expensive than the one referred to by Mr. Hillyer, as the upper and lower die retainers are necessarily forgings or steel castings. Then, too, there is considerable machine work not only upon the retainers but upon the dies and keys as well. Where a large number of duplicate pieces have to be made it is a great saving, owing to the fact that a practically unskilled man can use it, doing more and better work than a fairly good man could be

undertaking, while it is comparatively easy to tear down.

The trade press of today is a much different and much more efficient medium than the trade press of a decade or two ago, when trade journalism was more in the formative stage.

Manufacturers, jobbers and retailers today are the clients, so to speak, of the scientifically conducted trade press, which pleads their cause before the courts, as well as in the field of business, with superior thoroughness and scrupulous conscientiousness.

The modern trade journal has done more to bring manufacturer and retailer together, and to make them understand each other better, than any other factor in the world. The manufacturer may speak to the retailer through the intermediation of the trade press quite as satisfactorily as if both met face to face.

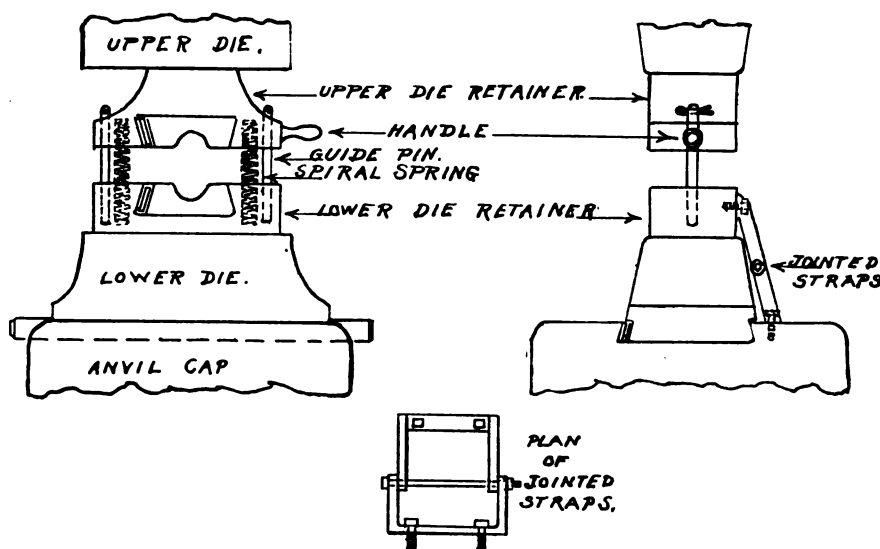
All this is the outcome of the confidence which the trade press has won for itself through proved efficiency.

The advertising pages of the modern trade journal are not advertising pages in the old sense of the word, but rather pages of information which the manufacturer gives to the retailer. These pages are read assiduously and interestedly, because through them the dealer, figuratively speaking, visits the great markets in the trade, to make his selections.

Hence, given a worthy product, wisely written advertising text and an authoritative trade journal, and the manufacturer's success is practically assured. The writer himself, on several occasions, has seen retailers upon receiving their weekly trade journal, begin at the first page, and keenly enjoy their visit to the various advertisers' establishments, made possible by printers' ink and the present-day postal facilities.

The storekeeper who, today, by means of the trade press, can sit in his establishment and learn from week to week what new products are being offered, what new improvements have been made, what new fashions are coming into vogue, etc., is thrice blessed. This is a real opportunity, and prudent retailers are taking advantage of it.

A competitor, indeed, often steals a march on "the other fellow," simply because he is a closer reader



A STEAM-HAMMER FIXTURE THAT HAS MANY ADVANTAGES

and his description of them are good; in fact, the advantage of such a tool or fixture over the more ordinary steam-hammer swages that have to be held by hand is too obvious to call for discussion, particularly when there is not a spare man around to hold them.

This swage of Mr. Hillyer's has brought to the writer's mind a steam-hammer fixture for similar work which he designed several years ago. The one in mind, however, had a further advantage in being made so that different dies could be used in it; thus making it suitable not only for a wide range of swaging but it could also be used to make small drop-forgings. And being attached to the anvil cap of the steam hammer by jointed straps instead of directly to the lower die of the hammer it could be folded back against the frame of the hammer, fairly clear of the dies,

expected to do with ordinary tools. And then, too, a steam hammer is not tied up while it is being used.

The Advertising Pages of the Trade Press as an Educational Factor

ROBERT FRANCIS NATHAN

At no time in the history of journalism is the power of the trade press more apparent than right now. The trade press has proved itself to be a genuine constructive force, an up-builder of business, and an influence for good.

The very purpose of the independent trade press, *to advance the industry which it represents*, compels the closest concentration of effort, and the expenditure of a vast amount of money as well as mental and physical energy. To build up has always been a big



of the trade press, and is thus enabled to keep his stock more up to date.

How I Got My Start in Smithing

J. HARRY HILL

I was sixteen years old when I thought of taking up this line of work. My brother had a sleigh, and the runners were made of iron. He wanted them cut off and flattened out and a hole punched in the ends. We had no forge in which to heat them, but decided to use the air-tight stove for heating purposes, and this stunt was very successful. I then endeavored to build a forge and blower, but failed in the attempt. However, my failure in this direction

When I was twenty years old I believed I had done all kinds of work on the farm, and so thought I would try my luck in the city. I secured a job with a man for \$2.50 a week, and had to work hard from twelve to fourteen hours a day. I remained in this place for eleven weeks. I then took another job with a man 72 years old who was very kind to me and only required me to work nine hours a day. However, I was not satisfied. I wanted to get into business for myself, although I only had twenty-five dollars saved at the time. Well, I talked the matter over with my brother smith and he encouraged me to start, so I purchased a few tools here and there and bought a place in a small town. The lot was 120 by 120 feet,

a larger boat, so we built a yacht—a picture of which is shown herewith.

After this I decided that I wanted power in the shop, and installed a 4-H.-P. engine which I use for various kinds of work.

I work on all kinds of machinery, and repair anything that comes along.

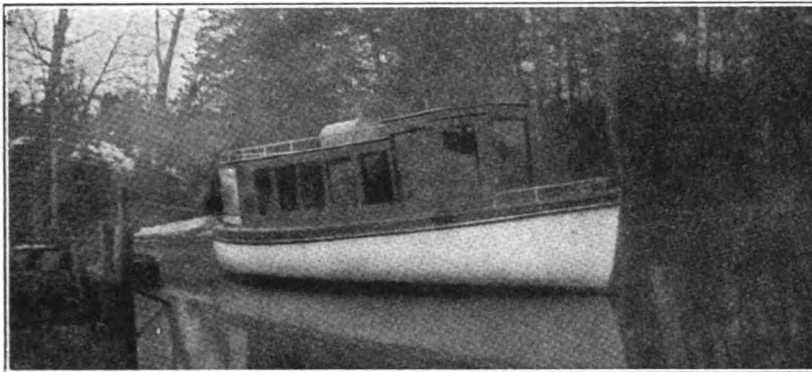
Two Cases of Diseased Feet Successfully Treated

E. H. MALOON

One of my customers brought in a foundered horse whose soles had become drooped—and a very poor shell. It was extremely hard to make the animal go soundly. The cause of this trouble was due to the horse losing its shell close back to the sole which, of course, left nothing to put the shoe on except the sole. I removed the bar shoe which she had been wearing and fitted up a narrow web hind shoe. I heated and burned a seat for this shoe right on the sole. Then I heated a crooked piece of iron and seared the balance of the sole so as to make it hard and stiff. I then made a pad of a heavy, hard piece of belting which I used between the shoe and the sole. I now put the shoe on very solid, making extra holes in every space available in the hoof to get a nail in.

I sent the horse home with the expectation that she would be lame, and requested the owner to blister the coronary band. I had not seen man or horse for about two months when the horse was brought to be shod again, and much to my surprise there was no indication of lameness at all. It seems she had carried her weight on the sole until the convexed or drooped sole had become nearly normal and the sole and shell had partly come together; and I have no doubt but that they will eventually unite and become perfectly sound again.

Case number two was a flat footed horse which became lame, but the lameness could not be located, and on general principles we applied tar and oakum pads and bar shoes. Shortly after this a sore appeared at the top of the hoof which had a discharge of white pus. This white substance was entirely new to me, as the color which I had seen in cases of this kind was usually dark and I called it canker.



A POWER BOAT BUILT BY A BLACKSMITH

did not discourage me in the least, and I immediately started to build a shop, 12 by 14 feet, on the farm. I then built another forge and blower which was more successful than the first one and which I used for about one year. After this I borrowed a blower from a friend, but soon found that I had no way of operating it, so I was obliged to devise a means of my own in order to use the blower. I took a small pulley and drilled holes large enough to admit a $\frac{3}{8}$ -inch rod in the rim and top. I then took a rim, 2 by $\frac{3}{4}$ and 30 inches in diameter, and used this for the speed pulley which gave satisfaction for two years. I then invested in an old Buffalo blower which had been used so much that the bearings were worn out; but I re-babbitted them and am still using the blower. And so on with a number of other tools which I undertook to make and which served my purpose admirably for the time being.

with an old house on it. Here I started to prepare for work which came very slowly for awhile, but in less than a year I was obliged to build a new shop. I stretched this shop out to 48 by 16 feet, and used the old building for a paint shop. I accomplished this much in about two years. In the meantime I made a number of tools and purchased a few, so that I had plenty to work with.

During the third year my brother and myself had a desire to own a gasoline motor boat. We got a 16-footer with a three-H.-P. motor in poor condition. I knew absolutely nothing about this line of business, but I thought it was time I learned how a gasoline engine was made. Therefore I took the boat and the engine to pieces and finally got them in good running order. We then had the nicest little boat on the river, and used it for two years. We at that time concluded that we would like



With the assistance of a veterinary we opened the foot on the bottom at the toe between the shell and the sole. Then we applied an antiseptic and bandaged with cotton and placed a plate over the shoe, which plate could be removed when necessary.

the shoe, covering the entire bottom with a good pad, and nailed both shoe and pad on, and between plate and pad we packed oakum, driving it in with an iron. The result is that the horse is working every day and doesn't show any sign of lameness.

in which the human note predominates, the designer of the machine shown here cannot ever quite forget the long hours spent near the center of a poorly lighted shop, trying to grind "chill plow points" on an emery stand of the common type.

Those under whom the first and second apprenticeships were served did not explain the principle of the most common "emery wheel truer." Had this been done, the truth—that it is almost impossible to keep an emery wheel true when the work is held upon the wheel rather than upon the rest—might have been recognized rather earlier. It matters not whether one does or does not care for the analysis of the conditions, the fact remains that chill points, axes, etc., wear out the emery wheel very fast, and the task of grinding is a difficult one.

The idea illustrated here is offered with the hope that he who constructs a machine of this kind may find an irksome task converted into a more interesting and profitable job. This design is a compromise between the simple and the elaborate. The simplest form would consist of a beam, swinging vertically, carrying the clamps 2, 2 and 3, Figs. 1 and 2; provision being made for forcing the work under and against the emery wheel by means of pressing the foot against the lower end of the beam; but in that case it would be difficult to provide for the vertical adjustment. A more elaborate form might consist of an electro-magnetic clamp for holding the work, with automatic transverse feed and vertical screw adjustment.

The plow point or other work may be ground upon one or both sides and the operation may be as follows: The apparatus being in the lower position, the plow point or other work, 1, Fig. 1, is placed between the corrugated clamps, 2 and 3, and secured by pressing downward upon the lever, 4, which is an extension of one side of the top clamp, 2. The machine and work being raised to the proper height by pressing downward with the foot upon lever, 7, the work may be gradually fed under the emery wheel by means of the hand wheel, 5, and feed screw, 6. When the section of the work under the emery wheel has been reduced to the proper form, the mechanism is returned to the starting position,

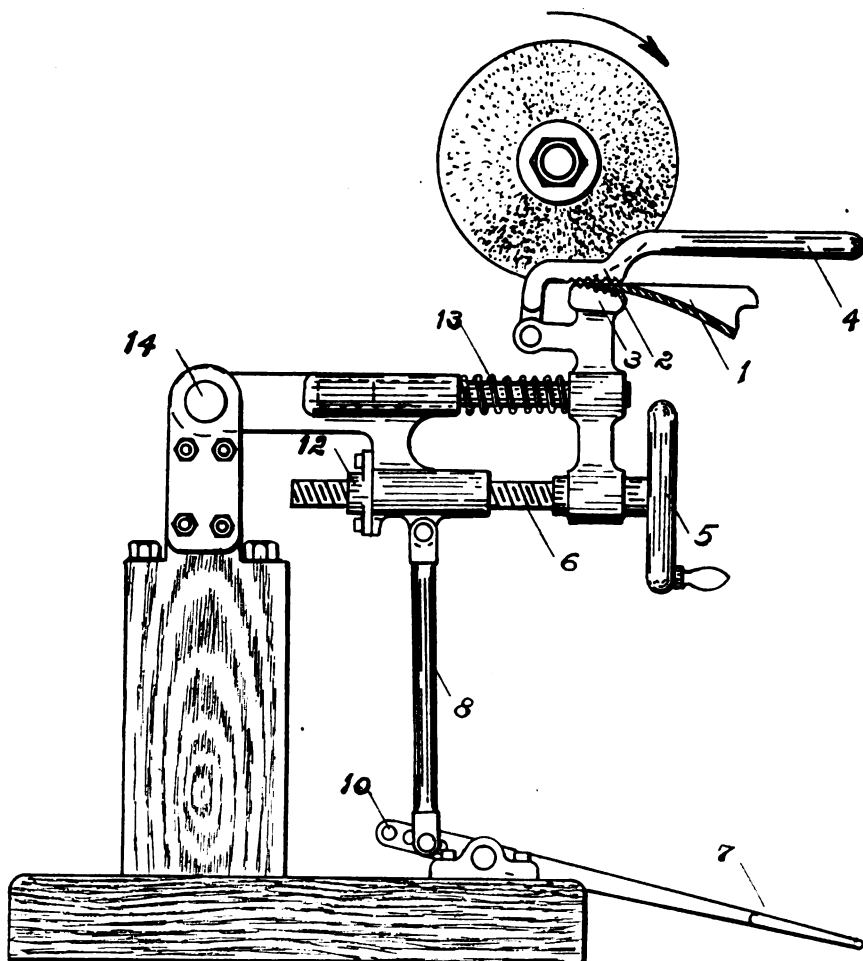


FIG. 1—AN ADJUSTABLE HOLDER FOR GRIPPING WORK WHILE BEING GROUND

In a short while, the lameness had entirely disappeared. Shortly after this the horse lost his plate and became so lame that it was necessary to remove the shoe. When the shoe was off we noticed that the lameness disappeared. The owner drove the horse to my shop without a shoe and asked me what he had better do and if I could advise him why the horse could go better bare-footed than with a shoe. I thought the matter over and concluded that the trouble was caused at the time when the pus was in the foot, and that the laminae was wholly or at least partially destroyed by the formation of the pus. When the animal was obliged to stand up on calks it caused the internal structure to settle and also caused extreme pain. Therefore, we welded a plate on

Of course, we are unable to judge how long this will last.

An Adjustable Holder for Grinding Work

A. C. GOUGH

Most probably not many new shop tools or machines are invented by any one who has not done the actual work which the apparatus is designed to facilitate, and who has not for a period of time felt keenly the need of such aid. After one has passed through these various stages of development it is not easy to describe some new machine or process without mentioning some of the usual difficulties which brought forth the idea. While this is not to be a story



the next section of the work placed in position and fed under the emery wheel—this continues until the work is finished.

The parts of the machine may be castings or forgings with forms varied according to the materials at hand. Provision for greater vertical adjustment for varying heights of wheels may be made by extending the pedestal with a number of holes for the pin, 14, about which the mechanism hinges. In that case it is necessary to provide for extending the length of the rod, 8. The holes, 10, provide for small vertical adjustment. The screw, 6, may be converted from a common vise screw, the nut being secured as shown at 12. The coil spring, 13, is not absolutely necessary; however, it prevents the work from pulling under the wheel too fast and makes the return easier. An emery wheel not more than 1½ inches thick is most suitable, as then the bottom part of the clamp, 3, will not need to be more than three inches long, which will be better for work of curved form.

The Spirit of the Smith

E. V. SYRCHER

Along the stern, rock-bound coast of Maine, in the region of Penobscot, lived a sturdy blacksmith. For years his forge-fire had burned ceaselessly under the tall pines that graced the frowning shore.

It was in the palmy days when ship-building was at its height in Maine. Our smithy forged the huge anchor chains, and many the ship that carried a little three-cornered device on its anchor chain—the trademark of Valmer, the smith.

One day, as Valmer was welding the links of a great chain, a young man strolled in and sat watching him for some time—watched him hammer and hammer the glowing links. Many times the smith plunged them into the fire; drew out the flaming iron and hammered and hammered—only to heat it again and hammer, hammer, hammer.

Finally, drawing his hands from his pockets, the worldly-wise asked, "Why do you hammer one link so often, my man? And then heat it and hammer it, over and over? You'll never make money that way!" he added.

The old smith never stopped his work until, placing the link in the roaring forge, he slowly said, watching the fire carefully and continually, "Young man, my work is my own and I make it worth my own. You of the world think not of the work, but only of the money—the money—the money." His voice trailed off as he drew the glowing iron from the forge and hammered and hammered and hammered with heavy, resounding blows.

In the strange, flickering light his sinews stood out like steel cords and

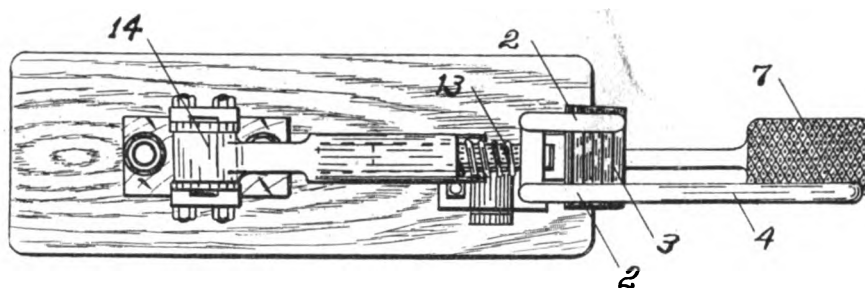


FIG. 2—A PLAN VIEW OF THE HOLDER FOR GRINDING WORK

his muscles rippled smoothly under the ruddy skin. His hair was gray, his face wrinkled, but the roaring forge showed a kindly, benevolent smile on his begrimed countenance.

The young man continued watching, fascinated by the smith's industry, by his marvelous persistency, his untiring energy.

* * * * *

The mainmast had crashed down. The sails were gone! And the storm grew blacker. The wind was terrible, the cold, driving rain stung to the bone, mountain after mountain of water tore the length of the ship, sweeping everything in its path. It was hopeless. The howling wind blew the ship scurrying before it. On and on they were blown.

A dead black line with a ragged white edge suddenly loomed ahead. A dull, heavy roar sounded menacingly.

"Breakers ahead!" shouted a half-drowned sailor, clinging to the stump of the broken mast.

"Heave the port anchor!" cried the benumbed captain in desperation.

With difficulty the port anchor was swung over and sent spinning on its mission of hope. It caught hold. The ship started swinging around in answer to the chain and then—it parted with a jerk!

"Heave the starboard!" came the instantaneous command.

Again the chains went humming over the side. The anchor dragged along the loose sands. Gradually the chain tightened—it was taut! Would it hold? The ship was swinging with the wind. Crack! with the report of a cannon a link snapped. A groan issued from the men now huddled in the stern.

"The sheet anchor, men!" sobbed the captain.

The great anchor was swung over; the capstan purred as the chain hum-

med through the hawse hole. Anxious eyes watched its going. A hurried, fearful prayer issued from a hundred parched throats.

The anchor caught with a precipitate jerk; the ship groaned and creaked under the terrible tension; the hawse hole ripped to pieces. But the ship was headed with the wind! It held!

They hardly dared breathe. The chain was played out to the last link! Anxiously they watched with awe-stricken eyes—watched for the awful snap that would throw them to the mercy of the booming, crushing breakers. But the chain held!

And on the last link was a little three-cornered device.

Could those crouching on that perilous ship see through the maze of the tossing waves, the dashing foam, the blackened sky and the scurrying clouds! If they could see the sturdy smith—Valmer of the three-cornered device—forging the great chains; if they could but see his ceaseless, indefatigable energy; his repeated, un-failing welding of each link in the great chain whose strength is solely determined by its weakest link.

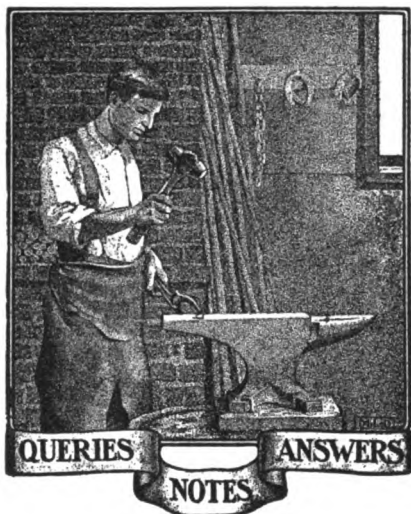
If they could but see the smith growing older and weaker; his mighty blows getting lighter, slower; his strength failing day by day; hair growing whiter; eyes dimming; face



wrinkling—hammering, hammering, hammering, faithfully, continuously, untiringly, they would understand: it holds!

He never heard of the hundred-odd lives he saved on that ship—he was dead.

And on the little white headstone that marks his resting place in the village graveyard in the region of Penobscot a simple line appears, under the name of George Valmer, the smith, "My work is my own—and I make it worth my own."



A Tool Holder.—Double a steel rod and shape it as shown in the illustration and place a link on it before the hand-hold is put on. This makes a fine cold-chisel holder and can also be used for holding small pieces and kingpins when making a butt weld.

WM. V. GIST, Tennessee.

Wants to Weld Auto Frames.—I would like to know if any of the readers of the paper can give me information on the welding of automobile frames. We are having quite a little difficulty in this work and any information from the readers will be greatly appreciated.

EMIL BURKE, Texas.

On Tires and Tire Heating.—I would like to know through the columns of the paper the usual draught allowed on large tires from 4 to 6 inches wide and $\frac{3}{4}$ of an inch thick—new wheels.

I would also like to see plans of a tire furnace in which wood is burned. I now heat my tires with a wood fire in the open, but I think a great deal of heat is wasted in this way.

P. J. ORAM, England.

Wants a Crucible.—Where could I obtain a ladle or receptacle suitable for holding melted cast iron in which to dip a red hot calk so as to have the iron adhere to the calk, after which it is dipped in water to harden it. Of course it can be melted on the calk in the fire, but this is a slow process. Therefore I would like to get an outfit for this purpose.

A. A. BARRICK, Iowa.

In Reply:—Crucibles for this purpose can be secured from any foundry supply house. Dixon Crucible Co. of Newark, N. J., can no doubt supply just the proper kind.

A. E. B., New York.

Several Queries on Oxy-Acetylene Work.—I would like to have the following questions answered through the columns of the paper:

(a) Can I use anything in scrubber and carbide tanks to prevent the water from freezing, and what is the preventive? (b) Can a fire box flue sheet be welded where it has cracked between flues, and will it be necessary to set boiler on end? (c) Is there any danger of acetylene gas firing back through steel wool in the brazing torch? I have $\frac{3}{4}$ by 6-inch brass pipe packed with steel wool.

J. C. CRITCHFIELD, Missouri.

Wants a Tire-Bolt Holder.—I see in the October number some good descriptions on the making of plow-bolt holders, and I would appreciate it if some of the brothers would give me a description for making a good tire-bolt holder. S. B. AMOS, Georgia.

In Reply.—Take a piece of $\frac{1}{2}$ -inch round iron. Bend one end in the form of a hook, $2\frac{1}{2}$ inches deep, $2\frac{1}{4}$ inches wide and $1\frac{1}{2}$ inch deep from the bend of the handle. A stud of tool steel is welded on, $1\frac{1}{2}$ inch from the bend, and is $\frac{1}{2}$ inch long after welding. File this to a bevel, harden and draw to a blue temper. To operate, put it on the wheel with the stud on the bolt head on the left knee on the lever. This bolt holder will hold them tight enough to twist them off.

E. V. S.

On Spring-Welding.—I would like to ask Brother John A. Curley of New York, through the columns of "Our Journal," why it isn't easier to make one weld in a spring than three as shown in the diagram in the September paper. I have been welding springs for years and have had no trouble in making them stand with a simple lap weld unless I get either one of the ends too hot, which will surely cause a break at the end of the weld. I have a heavy spring wagon job in this neighborhood which I welded over sixteen years ago with sharp sand as a flux and which has outworn the wagon and is as good as new today.

JOHN R. SHOOP, Oklahoma.

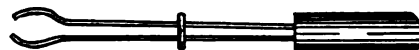
A Texas Power Shop.—We are sending you a photograph of part of our shop which is 24 by 50 feet. We do all kinds of repair work, but make a specialty of horseshoeing. On the rear wall as shown in the picture you will notice a case partly filled with handmade shoes. These shoes have been made by C. G. Crofoot, Jr., and he is seen in the photograph holding a hammer. The man with his arms folded is my father who has been in the blacksmith business for forty-six years and still likes the trade.

Our shop is equipped with a $4\frac{1}{2}$ -H.-P. Winner gasoline engine, power hammer, spoke tenoning machine, power drill and

emery wheel. We are planning on installing a power blower and rip saw. We also have hot and cold tire shrinkers, two blowers and two anvils, tire bolting machine and a number of anvil and woodworking tools. We are doing a nice business and prices are fairly good.

C. G. CROFOOT, Texas.

Some Delaware Prices.—Here are some of the prices I receive for work in Sussex County, Delaware: Buggy wheels complete, \$10.00 and up; wagon wheels, \$30.00 and up; carriage shafts, \$3.00 and up; retrimming buggy wheels, \$4.00 a set and up; new tires, \$4.00 a set and up; new rims on wagon wheels, \$2.00 a wheel and up; re-setting buggy wheel tires, 40 cents each; wagon wheels, 50 cents and up; new spokes,



AN EASILY MADE TOOL HOLDER

from 12 cents to 40 cents; setting new buggy axles, \$5.00 a set and up; new wagon axles, \$12.00 a set and up; wagon poles (no irons), \$2.00 and up; crossbars, 60 cents; plow singletrees, 40 and 50 cents; hooks and staples, 10 cents each; plow handles, 75 cents a pair; sharpening mower blades, 10 cents; new wagon hames, \$2.50 and up; working up iron, such as eyebolts and wagon braces, 10 cents an hour; working on automobiles, boats, motorcycles and gasoline engines, we get 40 cents per hour; and for all other odd jobs we receive 40 cents per hour.

We consider our prices fair, and hope the above will give our brother smiths an idea of the class of work that is done here, and it is not very heavy work.

J. HARRY HALL, Delaware.

On the Plating of Mirrors.—We should like to receive through the columns of THE AMERICAN BLACKSMITH a formula for plating mirrors, which you can undoubtedly furnish from reliable authority.

J. G. LAUER & SONS, Missouri.

In Reply:—Make two solutions as follows: Solution No. 1; boil 8 ounces of distilled water and add 12 grains of silver nitrate and 12 grains of Rochelle salts. After boiling for six or seven minutes, let cool and filter. Solution No. 2; take 8 ounces of distilled water and into a small quantity held in a tumbler put 19 grains of silver nitrate. Stir until dissolved; then add several drops of 26° ammonia until the solution becomes clear. Now add 16 grains more of nitrate of silver, stirring well until dissolved; then add balance of distilled water, and filter. The filtering must be done through a glass funnel in which the filter paper is placed. The solution must be stirred with a glass



A BUSY ESTABLISHMENT IN IDAHO WHERE GENERAL WORK IS DONE AND SEVERAL LINES SOLD



rod. Keep the solutions in separate bottles marked No. 1 and No. 2. To do silvering: Clean the glass with ammonia and wipe with a wet chamois; then take half and half of the solutions in a graduating glass, stirring well with a glass rod, and pour on the middle of the glass. It will spread over the glass surface if laid flat. Leave until the solution precipitates.

BENTON.

On Shoes and Shoeing.—In reply to Mr. F. F. Denizle's query, presuming him to be a country smith like myself who does various other work besides horseshoeing: It is quite common in country shops in New Zealand to make the shoes while the horse is in the shop. The old Scotch style was to measure the length and width and add them together, but I always found that the shoes would be too short by about half an inch, according to this method. Therefore I think it a far better plan to make the shoes after the horse has left the shop, and I have been doing this for the last twenty-one years. Have a stock of shoes on hand suitable for the class of horses you are in the habit of shoeing, and when the horse comes in you can easily pick out the shoes required and replace these in your sample rack after the horse has left the shop. This method does not take up any more time and is generally more satisfactory to your customer. It is always advisable to have plenty of length, as the difference in the extreme forward and the extreme down growths entirely alters your measurements after the foot is trimmed, and by having a heel cutter to trim off after fitting without reheating you get exactly what you want. I think it is up to the anvil manufacturers to get up something in the heel-cutting line.

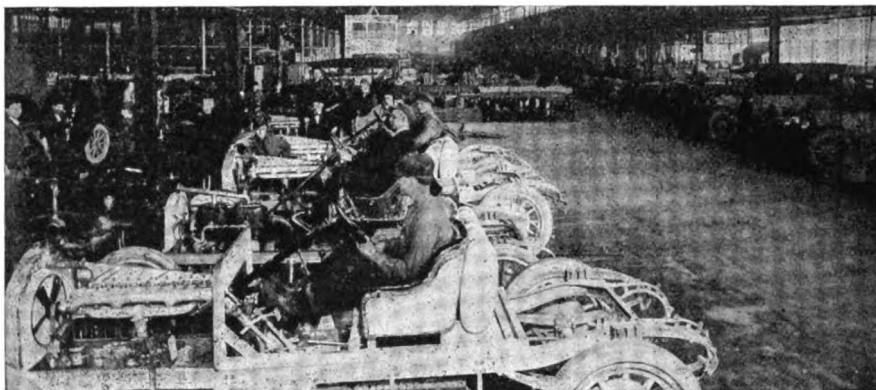
Just a word about "Mr. Scientific Horseshoer," before I close. I imagine he is the man who can successfully shoe the abnormal foot, varying in system both ways (from the extreme forward and the extreme down). The mechanical shoer shoes entirely by the normal foot.

JOHN A. MUNRO, New Zealand.

About Work in Australia.—The class of work done here is principally heavy work, such as the building of wagons, drays and carts. Wagons are built to carry up to 15 tons and are made with heavy wheels built of Australian hard wood. The hubs measure up to 16 inches in diameter by 15 inches long; and felloes, generally 5 inches deep or in proportion to width of tires required, which vary from 4 inches to 8 inches.

As Australia is thinly populated outside of the coast, all town supplies are carried—in some cases as far as 300 miles, where there are no railways. In out-of-the-way places blacksmiths and wheelwrights are engaged in repairs more than building new work. The repairs consist of all kinds of wood and ironwork, including vehicles of every description, which are mostly imported from the large centers. The American Sarven wheels are largely used for light vehicles as they can be purchased at a much lower figure than handmade wheels could be.

I am a woodworker and employ a blacksmith continually. Blacksmiths and wheelwrights are almost unprocurable in Australia, and receive very high wages—from 80 shillings (\$19.45) upwards per week of 48 hours.



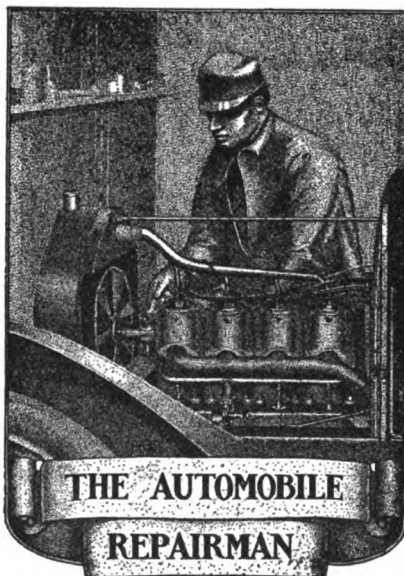
TESTING THE CARS BEFORE SENDING THEM OVER ROADS

I am much interested in many articles contained in THE AMERICAN BLACKSMITH, especially vehicle building and the subject of tires which is our principal work. I have not yet seen a cold setter. We use the up-setter and the hot process in putting them on.

All heavy wheels in Australia are made with a tapered foot on spokes with no shoulder, and driven with a big hammer, weighing from 15 pounds upwards.

I have read several arguments as to the draught on a tire. We make the tires $\frac{1}{8}$ inch smaller than the wheel in some cases. We charge according to the size of the tires, which vary from 3 inches to 8 inches.

WINTON, Queensland.



Before dissecting the coil or magneto, be sure the trouble is not with the plugs. Perhaps they need cleaning or new adjustment.

When assembling parts in which split pins are used, it is quickest to use new pins, and not those which have been removed in taking down the parts. Sometimes, however, the old pins have to be used, and difficulty is experienced in straightening them. A procedure which is generally effective consists in gripping the splayed ends of the pin between a pair of pliers and resting the ends upon the anvil. A tap on the head of the pin spreads that end and closes up the other end, straightening the pin and restoring it to its original shape, so that it may be replaced easily.

To clean the glasses of sight-feed lubricators without dismounting take a rod of which the end has been heated red hot, and hold it near the glasses. This will melt the solidified oil on the sight glasses, and the drip of the oil will once more be visible. Another way is to have a piece of twisted wire connected on the end of the drip-nozzle inside the glass of the lubricator. The oil runs slowly down the spiral path, and is prevented from splashing over the glass and obscuring the view.

If the first attempt made to loosen a refractory nut or stud does not prove successful, do not persist with too much effort, particularly if you are dealing with a stud, for the twisting of the bolt or the breaking of the stud (the last the most undesirable) is very likely to happen. First dose it well with kerosene, and give the oil half an hour's opportunity of finding its way round the threads, which it will usually do, when the possession and use of a box spanner will generally produce the desired effect. If, notwithstanding the kerosene, the nut or stud is still obstinate, try the effect of a little expansion by heat. Heat the box spanner as hot as possible. Then place the heated spanner over the nut or set screw, and keep it there long enough to warm up the nut well, but not to heat the bolt. Then try to move it again with another spanner, and unless it is one of the most obstinate nuts ever made it will come away. Another method is to expand the nut still more while it is warm by holding a hammer or other weighty piece of metal on one flat of the nut and tapping the nut on the opposite flat with another hammer. Go all round the nut this way if possible, and it will then be possible to remove it, unless it is hopelessly rusted up, in which case it must be cut away.

In overhauling a car, a trick worthy of consideration is that there is always likely to be a greater or less number of bolts that can be rendered more accessible—at least in the mechanic's opinion—by simply inverting them, though to do so may possibly impair in some slight degree the workmanlike appearance admired by the designer or manufacturer responsible for it. Of course, care must be taken not to invert any bolts that have a better reason than appearance for being the other side up, and it is to be remembered that a bolt dropping out is apt to be materially worse than a nut dropping off. But, with cotter-pinned nuts, for instance, there is little sense in working the wrench in frame channels, etc., when the head of the bolt might better be there.

Automobiles that are upholstered in light-colored leather frequently present an appearance of untidiness which can be easily overcome. To clean and remove stains from



light-colored leather the following mixture may be used with good effect: Boil a pint of milk, let it cool and add one drachm of sulphuric acid. Shake well and then add half a drachm of oil of lavender, one pint of vinegar and the white of one egg beaten to froth. Keep in a tightly corked bottle. Rubbed on the leather with a soft cloth, it greatly improves the appearance and removes the stains.

Great care must be taken not to bring a naked flame near the openings in the top

gasoline power shop. These suggestions are timely, and as it is cheaper to purchase non-freezing solutions than to pay for the repairing of cracked engine cylinders, the information may also save you money.

Water is practically incompressible, boils at 212° F., and freezes at 32°. Its expansion in passing from the

said to withstand freezing at all temperatures down to as low as 70 degrees below zero. These ready-prepared solutions can, however, be diluted to any degree for use in radiator and motor.

Denatured Alcohol

This is popular with a great many engine users and also automobilists,

CHLORIDE

	Degrees F
1 pound salt—1 gallon water.....	Freezing point 27
2 pounds salt—1 gallon water.....	Freezing point 18
3 pounds salt—1 gallon water.....	Freezing point 1.5
4 pounds salt—1 gallon water.....	Freezing point 17*
5 pounds salt—1 gallon water.....	Freezing point 39*

GLYCERINE

Water 95%—Glycerine 5%.....	Freezing point 30
Water 90%—Glycerine 10%.....	Freezing point 28
Water 85%—Glycerine 15%.....	Freezing point 25
Water 80%—Glycerine 20%.....	Freezing point 23
Water 75%—Glycerine 25%.....	Freezing point 19
Water 70%—Glycerine 30%.....	Freezing point 15
Water 65%—Glycerine 35%.....	Freezing point 12
Water 60%—Glycerine 40%.....	Freezing point 5
Water 50%—Glycerine 50%.....	Freezing point 2*
Water 45%—Glycerine 55%.....	Freezing point 10*

ALCOHOL AND WATER

	Degrees F.
Water 95%—Alcohol 5%.....	Freezing point 25
Water 90%—Alcohol 10%.....	Freezing point 18
Water 85%—Alcohol 15%.....	Freezing point 11
Water 80%—Alcohol 20%.....	Freezing point 5
Water 75%—Alcohol 25%.....	Freezing point 2*
Water 70%—Alcohol 30%.....	Freezing point 9*
Water 65%—Alcohol 35%.....	Freezing point 15*
Water 60%—Alcohol 40%.....	Freezing point 23*

WATER, ALCOHOL AND GLYCERINE

Water 95%—Alcohol-Glycerine 5%.....	Freezing point 28
Water 90%—Alcohol-Glycerine 10%.....	Freezing point 25
Water 85%—Alcohol-Glycerine 15%.....	Freezing point 20
Water 80%—Alcohol-Glycerine 20%.....	Freezing point 15
Water 75%—Alcohol-Glycerine 25%.....	Freezing point 8
Water 70%—Alcohol-Glycerine 30%.....	Freezing point 5*
Water 67%—Alcohol-Glycerine 33%.....	Freezing point 15*
Water 60%—Alcohol-Glycerine 40%.....	Freezing point 23*

*indicates below zero.

of the battery during or immediately following a charge.

Radiator caps occasionally develop a tendency to stick just when it is most important that they should be loose enough to be removed without difficulty. When this occurs, it is not necessary to force off the offending member by means of a cold chisel and hammer, or to apply that prevalent abomination, the pipe wrench. Instead, by winding a piece of chamois leather about it and twisting the ends tightly together, a sufficient grip may be obtained to loosen it in almost every case. Incidentally, it is well not to screw the cap on too tightly when the radiator is hot, as otherwise it may tend to set when cold, and give considerable trouble.

Filtering can hardly be overdone. When replenishing either radiator, fuel tank or oil reservoir, a strainer may be used; and it is a precaution that will be much appreciated by the motorist who fills his tanks at your shop.

In re-packing the gland of a water circulating pump use plenty of graphite with the packing. The spindle is seldom sufficiently lubricated, and the graphite will go a long way towards remedying this. Glycerine in the cooling water, as a frost preventive in cold weather, seems incidentally to considerably assist in lubricating the pump spindle.

To make a nut that is too large do for emergency service hammer on side of the nut until the round hole assumes oval shape. In this way the nut will take hold of the threads of the bolt on two sides and will maintain the part in position. It is well, however, to have a supply of auto-nuts for emergencies. A nut in need is a friend, indeed, and a profitable one, too.

Cooling the Engine in Cold Weather

The following information and the accompanying table will be of much interest both to the automobile repairman and to the owner of the

liquid to the solid state is about 8.55 per cent, and while this may appear very small it is sufficient to burn water jackets as though they were eggshells.

Electrolytic Action

Relative to anti-freezing solutions, some do not approve of their use, says *The Automobile Journal*, holding that they are detrimental to the metal parts of the cooling system. There is no doubt that alkaline solutions,

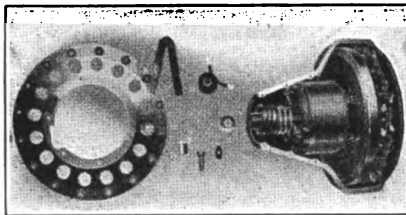


FIG. 1—SHOWING PARTS OF THE FORD MODEL T MAGNETO

which are electrolytes of high potential, produce electrolytic action whenever two metals of dissimilar potential are employed together—as the brass tubing of the radiator and solder at the joints, the aluminum or brass flanges closing the core print holes of the cast iron cylinder, etc. But where the car engine is exposed for any great length of time, or stored in an unheated building, some solution is essential.

Prepared Solutions

Among the prepared anti-freezing solutions on the market are some

as it is easily obtained and mixed with the cooling water. When added to the contents of the cooler, in proportions of one part to three of water, the mixture will not congeal until the temperature has dropped below zero, and even then will not solidify, only the water in the solution forming flakes or crystals, making a snow-like mass.

Given the capacity of the cooling system, it is an easy matter to ascertain the proper quantity of alcohol to employ, and the freezing temperatures are given in an accompanying table.

Use of Freezometers

With alcohol solutions it is advisable to purchase and use a combined hydrometer and thermometer. They are inexpensive and comprise the indicating device, also a jar for floating the hydrometer-thermometer in the fluid. If the indicated freezing point of the solution is higher than is desired, alcohol is added. If too high, water is employed. These instruments are invaluable in that they afford opportunity of testing the solutions, eliminating guesswork which may be disastrous.

Calcium Chloride

Among other ingredients employed as anti-freezing solutions are calcium chloride and glycerine. Sometimes the latter is combined with alcohol. Accompanying tables present formulae for mixing the different ingredients,



and the freezing points of each are also given. Calcium chloride is favored by some because of its low cost, and in its pure state occurs in crystals soluble in one quarter of its weight in water, and in alcohol. The commercial form contains about 50 per cent water of crystallization, and dissolves in half its weight in water. In preparing the mixture it is well to have several strips of blue litmus paper for testing. If it changes the color of this toward a red, the mixture is slightly acid and should be corrected by adding small quantities of milk of magnesia until the color of the paper remains unchanged.

Glycerine and Alcohol

A combination of glycerine and alcohol is favored by some because the former does not boil until it attains a temperature of 554° F., and even with the addition of alcohol, it is obvious that used with equal parts of water and alcohol its boiling point is well above that of some of the other ingredients. The solution, however, "creeps," the analogy being the creeping of the electrolyte on the terminals of a storage battery. This deposit does not dry up or evaporate, but rather increases after it has been in use a time. Consequently, the connections should be tight. Glycerine also attacks rubber, but as the cost of new piping is not prohibitive, new material can be easily fitted.

In the preparation of anti-freezing solutions whose boiling point is well below that of water, allowance should be made for the expansion of the fluids, especially on a mild day. If the cooler is filled to the top of the filler cap, more or less fluid will be lost by expansion.

Some Pointers on Ford Ignition

The Ignition System

The source from which the ignition current is obtained is a low tension magneto of the inductor type which contains but two parts; a stationary armature, consisting of a number of coils which are attached to the cylinder casting, and a set of permanent field magnets of the horseshoe type which are secured to the fly-wheel, the whole being incorporated in and a part of the motor. The magnets revolve with the flywheel at a distance of $\frac{1}{8}$ inch from the coils which collect the current from

the magnetic field and shunt it into the spark coil, where it is transformed from low to high tension and sent to the spark plugs to perform its function of igniting the charge. The magneto and its component parts are fully illustrated in Fig. 1.

The accompanying diagram (Fig. 2) shows the plan of wiring of the Model T motor.

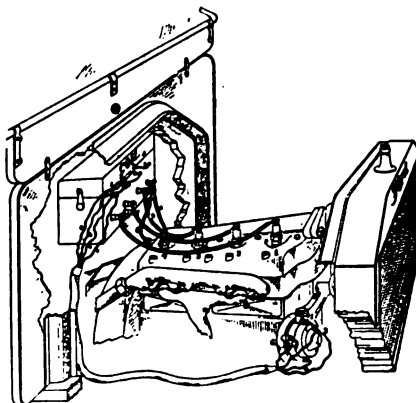


FIG. 2.—SHOWING THE WIRING ARRANGEMENT OF THE FORD

The upper row of binding posts are for the primary wires and are connected to the commutator. No. 1 unit is the one on the right or the one farthest from the steering post, and they number in rotation, 1, 2, 3 and 4. As will be noted by referring to the diagram the commutator contacts are numbered 1, 2, 4 and 3, counting in an anti-clockwise direction. The commutator wires are of four different colors. The wire marked (A) in the diagram is black and is connected from unit No. 1 to commutator contact No. 1. Wire (B) is red and is connected from unit No. 2 to commutator contact No. 2. Wire (C) is blue and is connected from unit No. 3 to commutator contact No. 3. Wire (D) is green and is connected from unit No. 4 to commutator contact No. 4.

The lower row of binding posts are for the secondary wire connections, and wire (E) is connected from unit No. 1 to spark plug No. 1. Wire (F) from unit No. 2 to spark plug No. 2. Wire (G) from unit No. 3 to spark plug No. 3. Wire (H) from unit No. 4 to spark plug No. 4.

The two binding posts marked (PP) are for the magneto connections, one only being used for this purpose, while the opposite post can be used if desired for battery connection.

The wire (MM) in the diagram is the magneto wire.

If from any cause the primary wires, A, B, C and D, become so dirty that it is impossible to distinguish their colors and it becomes necessary to disconnect them it would be advisable to attach a tag to the end of each and mark it so that you will know to what coil unit or commutator contact it should be re-attached.

On account of the different lengths of the secondary wires it is practically impossible to connect them up wrong; bearing in mind the fact that the longest wire spans the greatest space and so on down to the shortest wire which spans the shortest space.

Irregular Ignition

The occasional miss in one or more cylinders is apt to be ascribed to the magneto, just because the proper reason is difficult to understand. The "missing" of explosions results in an uneven running of the motor, and it can usually be traced to its source by following these directions:

To ascertain which, if any, of the four plugs is fouled with oil, short circuited with carbon or inoperative from some other cause, open the throttle two or three notches to speed up the motor; now hold your two fingers on two outside vibrators so that they cannot buzz. The evenness of the exhaust will show that the other two are working correctly and that the trouble is not there; or an uneven exhaust will indicate that it is between the two that are free. If the two cylinders fire evenly, change the fingers to the two inside vibrators

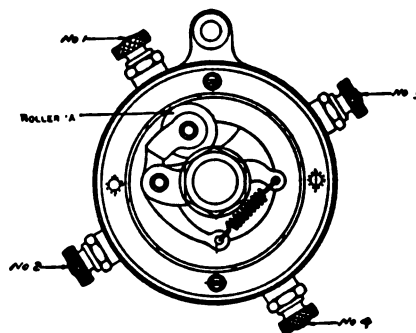


FIG. 3—ROLLER A SHOULD BE ON CONTACT POST NO. 1 WHEN CYLINDER NO. 1 IS READY TO FIRE

and again listen to the exhaust. Having ascertained in which pair the trouble is, hold down three fingers at a time until you find the one on which the motor does not fire. Cylinder



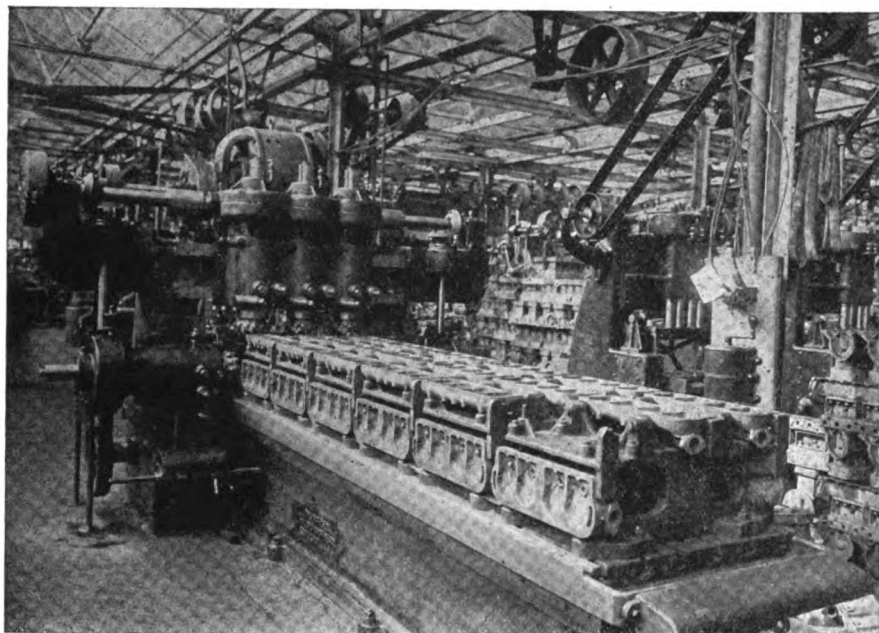
No. 1 is the front cylinder, and they number in rotation 1, 2, 3, 4. No. 1 coil unit is the one farthest from the steering post and they number 2, 3, 4, to the left. Then remove the spark plug and clean the core. Replace plug, taking precaution that all connections are correct and tight.

valves or a leak in the carburetor or cylinder head gaskets. A weakness in compression may be detected by lifting the starting crank slowly the length of the stroke for each cylinder in turn. In rare instances an exhaust valve may become warped by the engine becoming overheated, in which

advancing the spark lever that there are certain notches in the quadrant (known as cut-outs on the magneto) at which the motor does not respond with increased speed as naturally would be expected; whereas by placing the lever one or two notches in either direction this is overcome. It is advisable to locate these "dead points" by marks on the quadrant, and avoid placing the spark lever in such positions when cranking or driving the machine.

Carbon Deposit

This is one of the most fruitful sources of trouble in a gas engine. If the cylinders get too much oil, which they do if the oil level is too high or you use an inferior or a heavy oil, a portion of it will work up past the pistons and the intense heat will consume or evaporate the oil, leaving a deposit of carbon. This may be augmented by too rich a mixture which serves to deposit lamp black or carbon in a film on the inside and



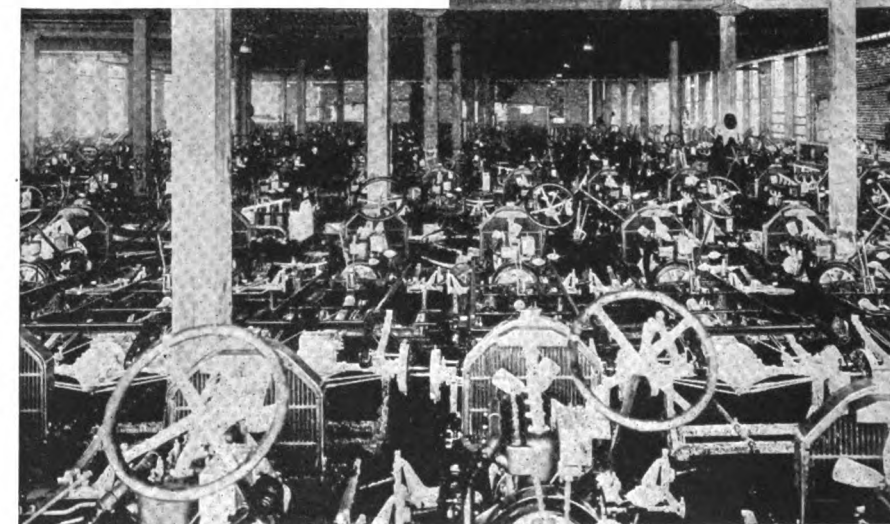
A PLANING MACHINE WORKING ON THIRTY CYLINDER CASTINGS AT ONE TIME

If missing continues, put in a new plug.

If this procedure does not locate the trouble, disconnect that particular cylinder wire from the coil and ground the spark plug end to some part of the engine. Hold the other end of the wire near the coil terminal, and if sparks are produced it is evident there is nothing wrong with the coil. As a further test, try changing positions of the coil units in the box. Also, inspect the platinum points on the vibrators and contact points, as they may be partially burned away or badly pitted.

When misfiring occurs, particularly when running at high speeds, it would be advisable to inspect the commutator, as the fibre may be worn so that the roller touches only the high spots or it may be that the roller has worn out of round and consequently forms imperfect contact on all of the points.

Irregular ignition and unevenness in the running of the motor, particularly at slow speeds, is apt to be the result of improperly seated



IN THE PAINT SHOP OF A LARGE MOTOR CAR PLANT

case the valve seat will have to be reground or the valve replaced.

It sometimes happens that symptoms of weakness in the ignition system are due to the magneto terminal spring in the transmission cover becoming covered with waste or iron filings which it attracts from the crank case. This will naturally hinder the action of the current and may stop the motor entirely.

You have undoubtedly observed in

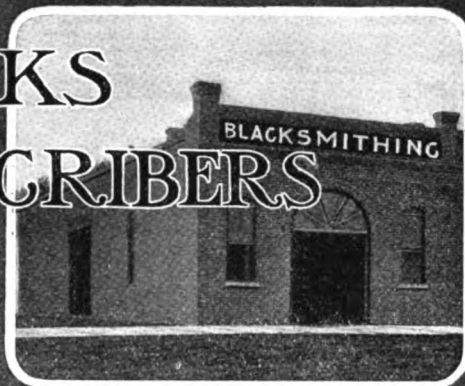
top of the compression chamber and on the heads of the pistons. The films thus formed will in time commence to scale, and the projections becoming fused by the heat of explosions will serve to prematurely ignite the charge.

Carbon deposit may also form on portions of the spark plugs, thus causing a short circuit which results in intermittent firing of the charge.

(To be concluded)



TIMELY TALKS WITH OUR SUBSCRIBERS



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To the Strangers

As this paper will go to quite a number of craftsmen who have never before seen **THE AMERICAN BLACKSMITH**, we want to say that this number of **THE AMERICAN BLACKSMITH** contains just as many reading pages as every other number. In every issue you will find high-class articles, practical information and substantially the same high quality as is observed in this number. You'll never find stale clippings, trade puffs or similar matter of low standard in these pages. Every article published in **THE AMERICAN BLACKSMITH** is published because it is helpful and practical; because it is of sound value to some department of blacksmithing.

The Prize Contest

The prize contest which was to end on December 31, 1913, has been extended to February 28, 1914. This has been thought best in order to give both new and old subscribers a fair and equal chance. A big pile of contest letters have already been received and its going to be pretty hard to decide which letter wins. If you haven't already entered a letter, write one right now and get a look at those fifty cartwheels.

To Oklahoma

Every smith, shoer and vehicle man in Oklahoma and the adjoining country should plan to go to Tulsa, January 19th and 20th, for the Fifth Annual State Convention. Headquarters will be at the new modern Oklahoma Hotel. There will be crowded into those two days of January all kinds of smithing talks, demonstrations and inspiration to last any real live smith for the next year. Don't forget—be in Tulsa, Oklahoma, on January 19th and 20th. Write to Mr. E. W. Reedy, Secretary, at Tulsa, Oklahoma, for full particulars.

Subscription Agents

When a stranger solicits your subscription to **THE AMERICAN BLACKSMITH**, or any other publication, insist upon his showing you absolute proof that he is an agent in good standing and is employed by the publication which he represents. Don't, under any circumstances, give the man your money if you are not sure that he really works for the paper he says he does. No matter what the man offers you—no matter what price he makes—no matter what premium he promises to send—**DON'T GIVE HIM YOUR MONEY IF YOU ARE NOT SURE.**

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The Past Year

The first of a new year is always an excellent time for review, and it is with a good deal of pleasure that we review the past year and view the changes that have taken place in the craft; and changes decidedly for the better have taken place in practically all departments. There is a very decided upward trend that is stronger and more apparent than at any previous period in the history of the trade.

Naturally, our pleasure in viewing and observing these changes is occasioned somewhat by the fact that "Our Journal" has helped in bringing about these changes. The degree to which **THE AMERICAN BLACKSMITH** has helped in these matters is perhaps best told in detailing a few of the things "Our Journal" has done in the past year.

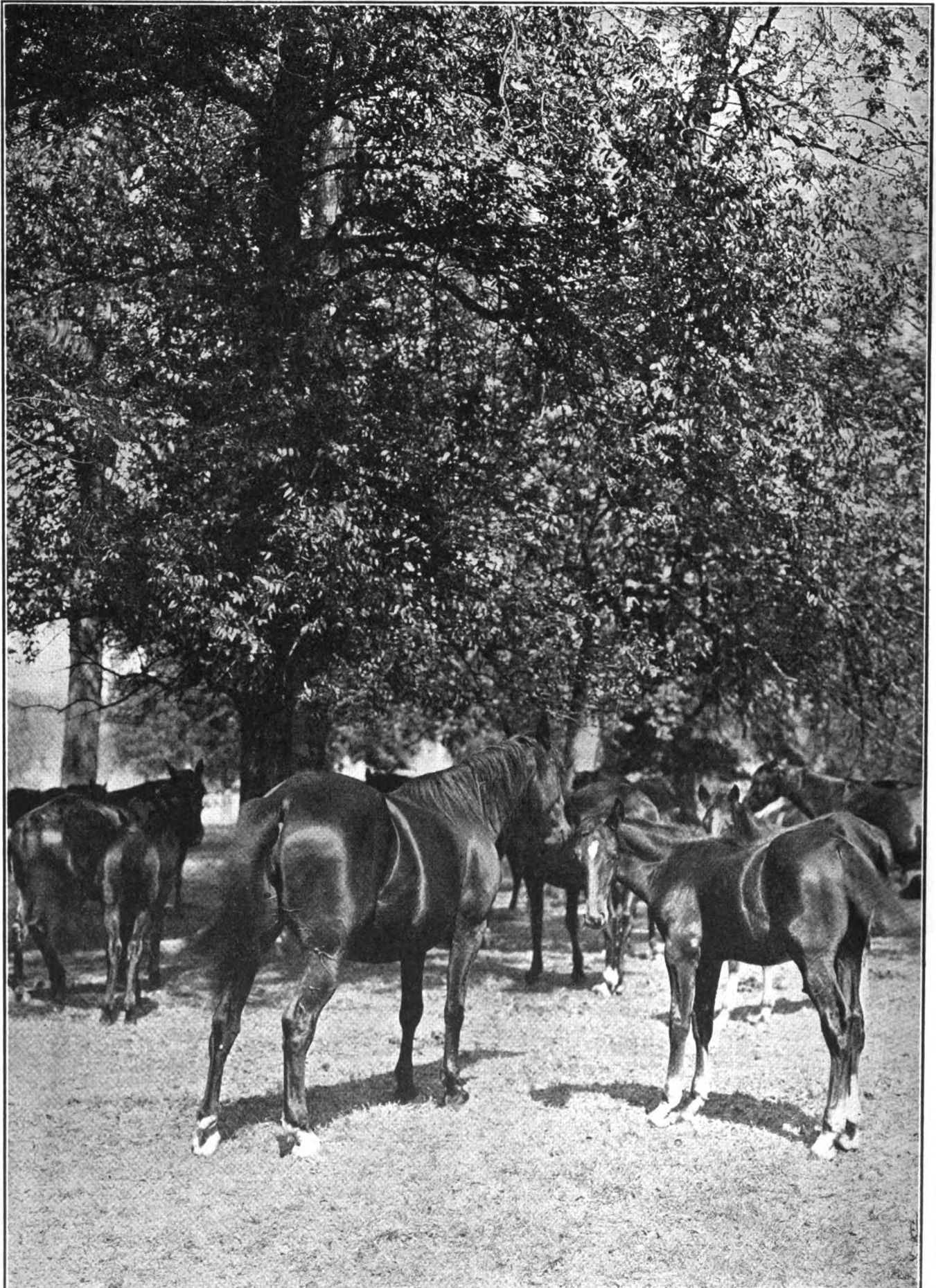
First, let us look through the pages of past issues, and observe the amount of truly helpful and practical business information that has been placed before our readers. Not merely telling the shortcomings along the lines of business, accounting and cost-keeping, but showing how to do business in a business way.

And then observe the Bowden System—can there be greater or stronger evidence on the part of **THE AMERICAN BLACKSMITH** as to whether or not it is sincere in its work for a better craft? A practical, easily-worked bookkeeping system that the great majority of general shops can use (and sold at cost). If you don't believe it, get prices on a similar outfit.

Then observe the high standing of the articles that have been published; note the titles, the names of the authors and the high order of the illustrations. Several of the articles published during the past year were on subjects never before touched upon either in textbooks or magazines.

As a result of the articles on the building of an oxy-acetylene welding plant, hundreds of smiths have installed these plants and have put themselves in readiness to compete with the larger shops.

And so we might go on pointing out the various articles that "Our Journal" has published during the past year and which we believe have at least in some measure helped the craft by helping the individual members of the good old trade.



KENTUCKY TROTting MARES AND FOALS



The Care and Shoeing of the Colt's Foot

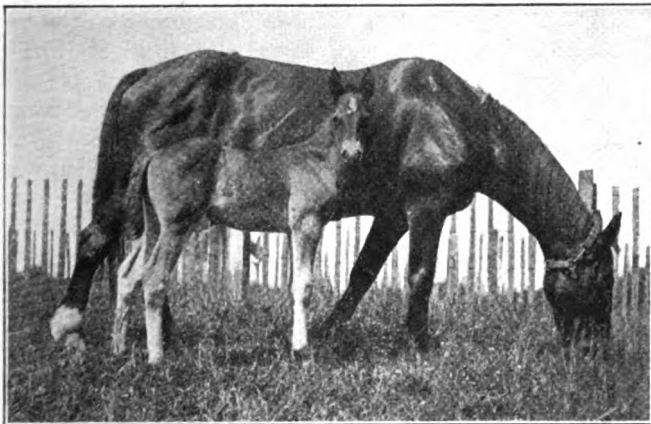


DR. JACK SEITER

WHEN shoeing a colt I have found that a study of the gait of its parents, when possible, is of great assistance, for, in correcting a fault, it is well to know whether it is individual or hereditary. And before going into the subject of this article I wish to register a note of warning as regards heredity of gait. Time and again have I seen a breeder attempt to produce a colt of good conformation by crossing a horse of excellent structure (one with which the most

one or more respects. Naturally, this condition will also exist if we reverse the order of things and cross an ill-structured stallion with a perfectly-developed mare. The bad will invariably crop out in preference to the good. If more attention were paid to the conformation of both the sire and the dam we would not be obliged to cope with the large number of misfit animals that are raced today. It is not uncommon to hear some horseman remark that "Such a colt has license to be very fast, but he

drive prospective owners out of the business. But this thing has been going on for ages, and the chances are that it will continue to do so as long as the breeders insist on breeding their "pets," regardless of conformation or temperament, attempting to get perfectly-developed animals that will do to race and fix a standard type of race horse. Many prominent stallions, standing at high fees, have been handicapped because wealthy horsemen would insist on breeding their worn-out favorite road mare



WHEN SHOEING A COLT STUDY THE GAIT OF ITS PARENTS



HEREDITY HAS A GREAT DEAL TO DO WITH A COLT'S GAIT

exacting judge of horseflesh could find no fault) with a spindle-legged, knee-knocking mare; simply because she was well bred or had considerable speed. Naturally, he figured that the stallion would predominate in this union and the colt would be of the desired conformation. I have seen this mistake made year after year. The influence of heredity (for bad as well as good) cannot be better illustrated. The result is usually a leaning toward the bad, and the colt is usually of faulty conformation in

hits his knees or toes out with one foot," or some other malformation handicaps him from being a world beater. And after several years of training, during which time the horse-shoer and the bootmaker receive enough money to purchase a good animal, the colt is given up as a bad racing prospect and is retired—if a filly—to the broodmare ranks, to produce more of the same type; if a stallion—to do stud service, to fill the country with more trouble-makers. These are the sort that

to the stallion then in the limelight. Axtell and Bingen are recalled as two examples, but there are many more.

First Trip to the Blacksmith Shop

When the colt arrives at the age of two months its feet should be carefully examined. If dressing is needed it should be attended to at this time. Just as the human baby becomes bow-legged, the colt is liable to be foaled with or to acquire a faulty conformation. If the toes are excessively long they must be shortened. If the heels are abnormally



high they must be cut down. And if the foot shows more growth on one side than the other the high side should be trimmed down far enough so that the low side will also receive its share of the weight and bearing. If the colt shows the slightest inclination of being deformed, knock-kneed or nigger-heeled, we must dress down the outside of the hoof, especially the outer toe. It is also advisable in cases of this kind to rasp off the edges of the wall at the outer toe, enough so as to reduce it to the same thickness as the inner wall. By following these instructions at least once a month one can work wonders with a foot of this type.

Under no conditions should one apply a knife to the sole or the bars of the foot of a colt. Excessive cleaning out of the feet is not advisable, either. Naturally, we must look after the cleanliness of the feet, but unless there are positive signs of thrush one must not go to extremes—such as the free use of the “foot hook,” which is often the direct cause of forcing filth into the cleft of the frog or bars. If the parts were left intact and filled up with the natural growth of horn that

traction and consequently more thrush. In the majority of the cases the knife is entirely unnecessary, but generally a good washing out with warm water and soap to which some good antiseptic solution has been added will relieve the trouble. After this the foot must be thoroughly dried (generally, it will dry out by itself in a few minutes). Then the parts involved, the cleft of the frog and the parts surrounding the frog and bars, must be packed with some antiseptic powder. It is also a good plan to force some cotton or oakum into the crevices to help retain the powder in place. Several treatments of this kind generally suffice to cure the most stubborn case of thrush. But, as in all other cases of affliction that horseflesh falls heir to, an ounce of prevention is worth a pound of cure.

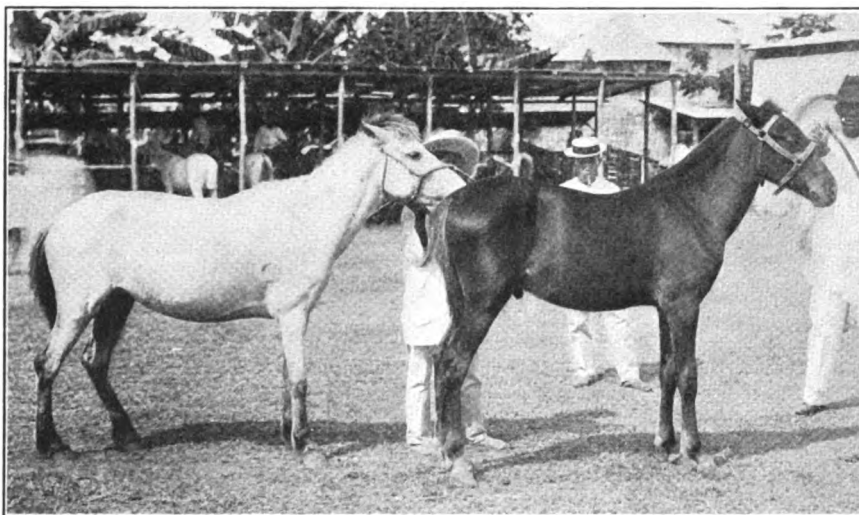
Care in Dressing Hind Feet

In dressing the hind feet it is as a rule advisable to keep the toes short and well rounded off, but the conformation must never be lost sight of. If there is the slightest sign of curby hocks we cannot cut the toes down too short nor keep the heel too high. And where there is a strong predisposition to this un-

derstand small details; consequently, the oftener we have them drilled into us and the oftener we are reminded of them the more apt are we to remember them. If we overlook the most minute detail which goes to build up an animal we will have a correspondent weakness somewhere; and “A CHAIN IS ONLY AS STRONG AS ITS WEAKEST LINK.”

With the above precautions and preventives ever before us we will have the proper sort of a foot to work on when the time for the first shoeing arrives.

The first shoes should be applied for protection only, consequently they must be as light as possible and the nailholes as few as possible and punched well toward the toe, so as to allow for the natural expansion of the heels. The foot should be leveled with the rasp only; no knife must be allowed to mutilate the sole, the frog or the bars. If we leave those structures intact and apply a thin shoe we do not rob the frog of its function—that of acting as a cushion not only to the foot but to the entire limb, also. The frog is the one thing we can depend upon to keep the foot in its natural elastic state. The sole and the bars depend upon the frog to furnish them with moisture, and they in turn protect the structures immediately above them. If the frog and bars are left intact as nature intended they should be we would not be troubled with contraction and its sequels—such as corns or quartercracks. The frog takes care of the entire foot. Man has as yet discovered no substitute that will take the place of the good, healthy, un-mutilated frog as a moisture-secreting structure; and never under any conditions should it be cut into. It is permissible to cut off the ragged edges, but there are few who can resist the temptation to cut off a little more than is necessary—the idea being to give the frog a symmetrical appearance—to make it take on the appearance of some of the pictures we occasionally see entitled “A natural foot.” The fact of the matter is, that a natural foot, untouched by the hands of man or his misery-producing tool, is about as unsymmetrical a piece of handiwork as the Creator ever endowed any animal with. Yet we attempt to make a model-shaped organ out of this crude-



A TYPICAL CASE OF “UP-BREEDING”—THE HALF-BRED COLT EXCELS THE DAM IN POINTS AS WELL AS IN SIZE

nature provided it would become almost impossible for the seat of the trouble to become infected. One must try and save all of the healthy frog, consequently only the ragged edges should be removed, for by carving out the healthy portions of the bars or the frog we only invite future trouble in the form of con-

soundness early shoeing is strongly recommended—the shoe to be square-toed and set well back from the toe, and the heels to be high and of good length.

Now, the above rules are simple, so simple in fact that they are known alike by the humble stable boy and the prosperous owner, but we often



appearing mass of sensitive and insensitive tissue. It is undesirable to interfere with the growth of the foot, at all, outside of reducing the wall sufficiently to enable us to get a good bearing for the shoe. The frog, bars and sole must never be touched. The more sole we leave, the less will we have to contend with bruises and corns. The more frog bearing we can save, the more jar and concussion will we prevent. Consequently, we will have to cure fewer corns and quartercracks, and above all we preserve the natural moisture which evaporates the moment we apply a knife to the parts and thus open the moisture-secreting cells.

Hard Frog Unnatural

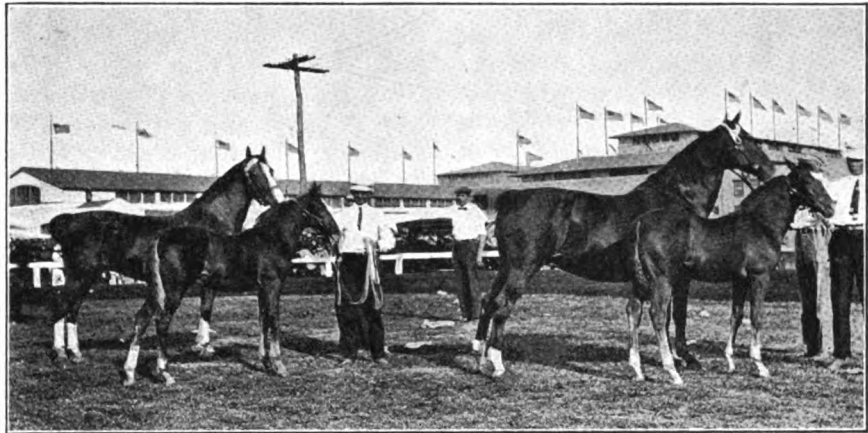
An animal will go lame if it steps on a pebble or a rock, especially if the sole, bars and frog have been excessively pared out. A frog that has been trimmed to the extent of robbing it of its natural function and in such a manner that it is forever kept off the ground will dry up and become as hard as a piece of stone. Most horsemen will admit that a stone will bruise a foot, but it is difficult for some to realize that a dried up frog is just as hard as a stone. The fact of the matter is they both do the same damage to the foot, with this slight difference, the stone acts on the sole, only, whereas the frog acts upon the sensitive structures that underlie it—the fatty frog, the preforans tendon (where it runs over the navicular bone to find its attachment on the semilunar ridge of the coffin bone), and above this the navicular bone. Can the frog protect those parts when it is robbed of the power to do so? Hardly.

"No foot—no horse," "No frog—no foot" are two true sayings; consequently, we must consider the frog as a link in the chain. In order to have a perfect working animal, all parts must work in unison. If even the most insignificant structure is out of order we are in trouble—the chain will have a weak link, and it matters not how powerful, speedy or game an animal is, when the crucial test arrives the entire structure will be no stronger than its weakest link or organ.

We hate to be told the truth. We do not like to have the little things that go to build the large ones drilled

into us; and the majority of horsemen upon reading the above will say: "We know that much ourselves." Certainly you do—but it's the things we know the most about of which we grow careless. We are too anxious to learn something new; consequently, forget the old and fundamental prin-

frog are to be left intact. The following is, however, the general procedure: the sole is carved out, the bars are cut out and the frog is cut away and shaped up. Then a shoe is applied that is usually from a quarter to a half inch thick. The moment this shoe is applied, the sole,



IT IS WELL TO KNOW IF THE COLT'S FAULTS ARE INDIVIDUAL OR HEREDITARY

ciples of our work. For instance, if a horse becomes lame, it matters not where, we look for something to cure the lameness—a hot iron or a liniment that may be still hotter. We do not understand the action of them, but they are the things we invariably go after; instead of looking after the little things, the things we understand and the things that are the direct cause of our troubles. And if any one should endeavor to explain them to us we would exclaim, "Why, I know that much myself!" Certainly you do, but why don't you use your knowledge before you are in trouble?

Changes in the Colt's Gait

The changes that take place in a colt's gait after being shod are due in a great measure to the abnormal changes that the structure of the foot often undergoes; changes that are not due to the ignorance of the persons in charge as much as to carelessness. In a natural foot the sole is perfectly flat. The frog, the bars and the sole all have an equal bearing upon the ground. If we take off just enough of the wall to get a level bearing surface for the shoe and then apply a thin strip of steel (the thickness not to exceed the amount of wall we have taken off) we will shoe according to nature or as near as possible to nature. Of course it is understood that the bars, sole and

frog and bars are robbed of their functions as weight-carriers and concussion-destroyers. They dry out and become atrophied and as hard as a stone. The colt is worked, and goes well for the time being, but after a few weeks he shows signs of going rather short-gaited, does not extend himself as he should or as he did when first shod. Again he is taken to the shop. We all know what the orders are: "Do not take a thing off of his feet and apply a heavier shoe"—a thicker shoe—in the effort to improve the action. In this manner the frog and sole are still further elevated from the ground with which nature intended they should come into contact at every step. After this change we have in rapid succession the dropping in of the quarters and contraction of the feet; followed by corns and quartercracks; and the foundation is laid for that dreaded of all foot troubles, navicular disease. When the hard, atrophied frog comes in contact with a stone or a rock, and the sensitive structures that it is supposed to protect with its rubber-like elasticity are bruised, then there will loom up in the near future a bloodshot sole, a bruised tendon or navicular disease.

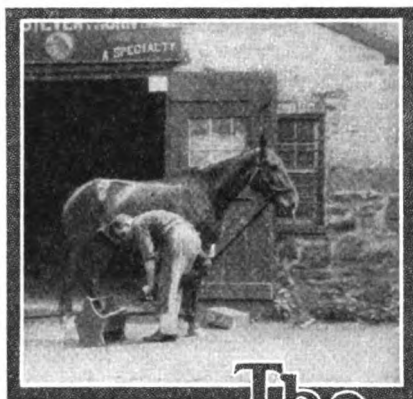
Natural Dressed Foot

When the foot is dressed in the proper manner, and after it is shod receives the proper attention and



care, it is essential to keep the feet soft and pliable. It will be found that not one half of the weight usually applied is necessary to balance a colt.

Now this may seem a broad statement to make, but it is a fact, as I have discovered during twenty years' work with the light-harness horse. Considerable of that time was spent shoeing colts and taking care of their feet on some of the most prominent stock farms of this country. What I say is not theory but fact; as the average horseman or horseshoer is well aware. We all know better, but often overlook the small details, always looking for large causes. Instead of getting at the seat of the trouble and removing it, many entirely overlook the real cause in their endeavor to correct the gait with new fangled shoes, toe weights, pads, bits, straps and the like.



The Horseshoer

Knots and Ties for Holding Horses

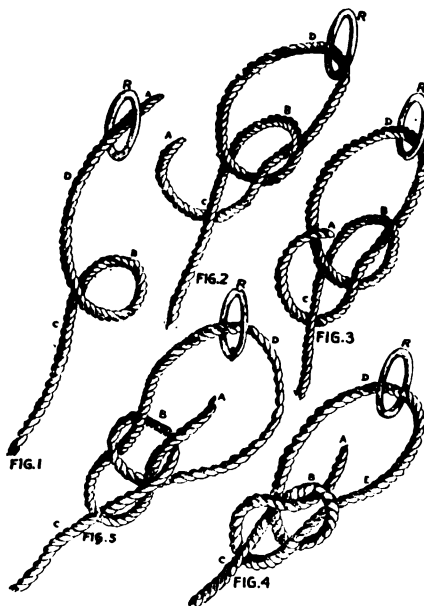
THEODORE MACKLIN

The shoer can often use a rope to advantage in overcoming a vicious animal or in holding an excited horse, and he will find a knowledge of suitable knots and ties of value. Without doubt the most useful knot is what is called the bowline. Next in importance is the bowline on the bight. These are the two important knots required in making the hackamore—used to lead, to tie or overcome horses.

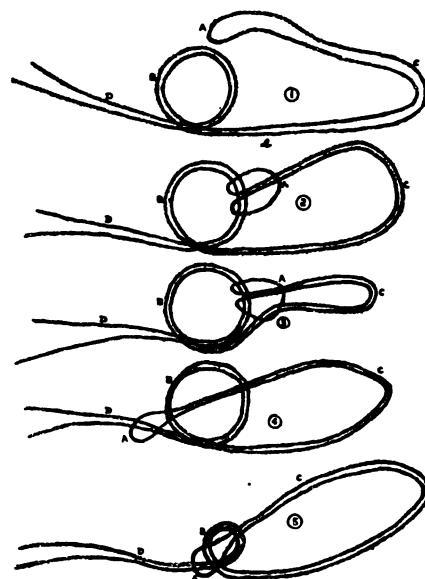
The common bowline knot is best made by taking a rope and passing one end through a ring or around a post, as shown in Fig. 1 (see the "bowline"). For convenience, in speaking of the parts of a rope, we will say that the portion of the

end used in the knots for tying is the end, marking it with letter (A), Fig. 1. The portion marked with the letter (D) is called bight, and the part that runs from (D) to the other end is known as the stationary part. After passing the end (A) through the ring (R) a loop (B) is made in the stationary part, as shown in Fig. 1. Care is always taken that the portion of the cord (C) to (B) is under the part with the letter (D). Next, pass the end (A) through the loop (B) and afterwards under the stationary part (C), as shown in Fig. 2. Thirdly, pass the end (A) through the loop (B) above, as shown in Fig. 3. Lastly, hold the stationary part (C) in one hand and with the other take the end (A) and the portion of loop (E), pulling hard on them as shown in Fig. 4. In Fig. 5 is shown the side opposite the knot. This is the common bowline.

The bowline on the bight is necessary in using a rope to throw horses. It is made as follows:—Using a long rope, double it in the middle. Afterwards, about four feet from the end (A) Fig. 1, (see the "bowline on the Bight"), make the loop (B), taking care to have the stationary part (D) remain above the portion with letter (B) at (E) (see Fig. 1). Secondly, pass the end (A) through the loop (B), always passing it from above, as in Fig. 2. Afterwards, pass the end (A) over the portion with the letter (C) above the portion with the letter (C), Fig. 3. In the Fig. 4 the fourth step has been taken, showing the end (A) carried



THE "BOWLINE" KNOT



THE "BOWLINE ON THE BIGHT"

down over the loop (B) to the stationary part (D). To complete the knot, as shown in Fig. 5, hold the stationary part (D) in one hand and the portion with the letter (C) in the other hand, and draw on them hard.

Knowing how to make these knots it is very convenient to use them in the following cases:

Frequently the horseshoer needs a halter when all he has at hand is a long piece of cord. In such circumstances the hackamore is very convenient. This is a temporary halter which is very easily made and can be taken off without difficulty when no longer needed. On making the hackamore, pass the end of a long cord around the neck of the horse and tie a common bowline knot. Afterwards put a loop over the horse's nose as shown in Fig. I. In Fig. II it shows where another loop is put over the nose. Thirdly, pass the cord (B) of the second loop under (A) of the first loop, Fig. II, which is done by bringing (B) under (A) from the upper part, as shown in Fig. III. The fourth step is to leave the portion (B) in Fig. IV sufficiently long to pass it over the ears and leave it as shown in Fig. V. The final step is to pull down on the loop (C) shown in Fig. IV, to tighten the halter and allow for passing the rope around with the stationary part, as shown in Fig. V. If you wish to tie a horse when using said halter it is better to pass the end of the stationary part (D) through the loop (C), which prevents slipping and untying.



FIG. I—PUT A LOOP OVER THE HORSE'S NOSE

A very effective and simple way of breaking colts is shown in the accompanying photograph. It is also used for breaking horses of the habit of resisting the halter. Put a strong leather halter on the colt's head. Afterwards, using a long cord, pass one end around the colt's body above the cross and posterior part of the front legs. If possible an iron ring may be fastened to the end of the cord, but if this is not convenient a common bowline knot will give the same result. Through the ring, or bowline knot, pass the stationary part of long portion of the cord. Afterwards, pass the end between the fore legs above through the halter. Beginning to guide the colt with the cord of the halter, generally he won't go, but as soon as the cord presses on the nose, the colt will follow without the least resistance. The object of using an

iron ring at the end of the cord instead of a bowline knot is to make the cord around the body of the colt loosen as soon as he is made to walk. When a horse acquires the habit of pulling the halter, this method is very efficacious to cure it. The cord is tied to the manger a little shorter than the halter, so that the loop around the body of the horse is tight before the horse contracts the cord of the halter. When the manger is very low, instead of passing the cord through the halter it must pass through a cord or loop that hangs from same; this prevents too hard pulling on the head of the horse.

Horses are easily thrown to the ground by using the pulling arrangement shown in the accompanying engraving. You must use a rope no less than 35 or 40 feet long. This is doubled in the middle and a bowline on the bight knot is made. Afterwards the loop is put over the head of the horse and adjusted to the desired size. You must take great care the loop isn't so tight as to endanger the comfort of the animal when he is thrown. Then the two ends of the knot are passed between the front legs and back around the ankles of the hind legs. It is preferable to use ankle bands with iron rings instead of the smooth rope. The rope is likely to scratch the ankles. When rings are used, the ropes are passed through them, one on each side, and afterwards through the loop of the bowline on the bight on each side. When the rope is put on the ankles instead of rings it must be wound around the principal rope before bringing it through the



FIG. II—FOLLOW THIS WITH A SECOND LOOP

side around the horse's neck. See Fig. VIII. When you want to draw the horse to the right, the party who holds the rope on that side must be in front on the right, while he who has the other rope must be in back on the left. To throw the horse down, draw on the ropes firmly, in this way raising the hind leg up toward the abdomen. As soon as the animal falls to the ground the man who holds the halter must grasp the horse's head and turn his nose backward from the ground to keep the horse from rising.

To throw cattle, a simple method is shown in the photograph. Use a rope 35 to 40 feet long. Placing one end around the animal's neck, tie a common bowline knot, letter (A) (see Fig. IX). Afterwards, pass the knot around the animal's body, back of the shoulders, and make a half knot at (B). Finally, pass the



FIG. III—PASS THE SECOND LOOP UNDER THE FIRST



FIG. IV—THE SECOND LOOP SHOULD BE LONG

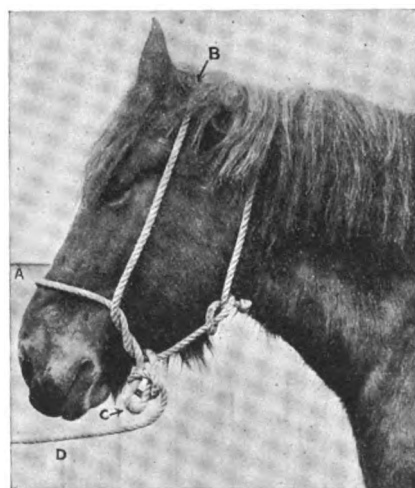


FIG. V—IT GOES OVER THE FORELOCK AND EARS



rope around the body on the hips and sides and make the half knot (C). It is preferable to have the rope pass across the spine in front of the hipbone on one side. This will prevent it from getting into the mud and from slipping back too far. When you are going to throw a cow, take care to have the rope pass in front of the udder. To throw the animal to the ground, draw the rope backward and on the side to which you wish the animal to fall. When it falls, turn the head of the animal upward to keep it on this side.

Besides, as the hackamore is not very convenient for cattle, a different temporary halter is used. Make a bowline knot on the end of a rope and pass around the animal's neck. Afterwards, make a loop on the stationary part of the rope and pass through the loop (A) in Fig. VI. After passing the second loop through the loop of the bowline knot, pass over the animal's nose, as shown in letter (B) of Fig. VII. To remove the halter, take the loop (B) from the animal's nose. This halter is very convenient when cattle are tied for dehorning.

A Radical Cure for Quarter Crack

JAMES R. PINCK

It is often desirable to cure up a quarter crack quickly. The very nature of the foot and horn being to grow slowly usually makes the cure of any hoof crack a time-consuming process. The edges of the crack cannot, of course, be made to grow together. The crack can only be eliminated by growing healthy horn to replace that portion that has become cracked. Inasmuch as



FIG. VI—A SIMPLE TIE FOR CATTLE

the growth of the foot wall amounts to but one fifth to one half an inch a month it will necessarily require

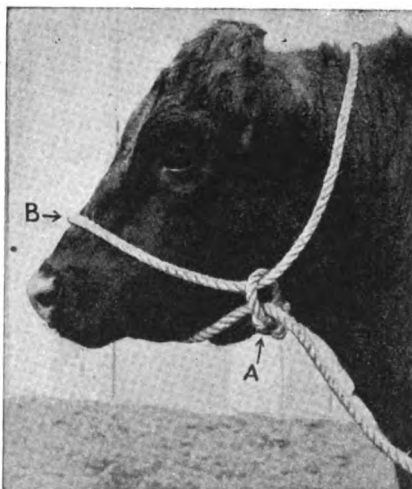


FIG. VII—THE LOOP PASSES OVER THE NOSE

considerable time to grow healthy horn in place of the cracked portion in the usual way.

The method of curing quarter

crack as here described will give the animal a sound foot in thirty days. It is, of course, not always possible nor consistent to use this method of curing a crack. But when a crack is to be healed in the shortest possible time, and the horse owner is willing to pay for the extra trouble and work involved, the following method is the one to use.

The Treatment

First prepare and dress the foot as though shoeing in the regular way, being careful not to cut down the horn too much. Pare and dress just enough of the hoof so as to get the foot level and balanced. Leave all the horn possible so as to hold up the strength of the foot—as considerable horn will later be removed to allow for the treatment of the crack. After dressing the foot, fit it carefully with a bar shoe having no toe clip. Give the shoe plenty of frog pressure.

Now lower the quarter where the crack is situated. This should be done carefully but thoroughly, cutting down the quarter all it will stand. Do not open the heels. After lowering the quarter at the crack, take the rasp and rasp the wall away right down to the quick for a space of from an inch to an inch and a half on each side of the crack. Rasp the wall down well from coronet to sole; cutting the crack out entirely. It may bleed, but rasp out carefully until the cracked wall is entirely cut away.

Now prepare a false toe clip as shown at A in the engraving. This may be made from nail rod and should be about one eighth of an inch thick and about five eighths of an inch wide. If no nail rod is to be had,

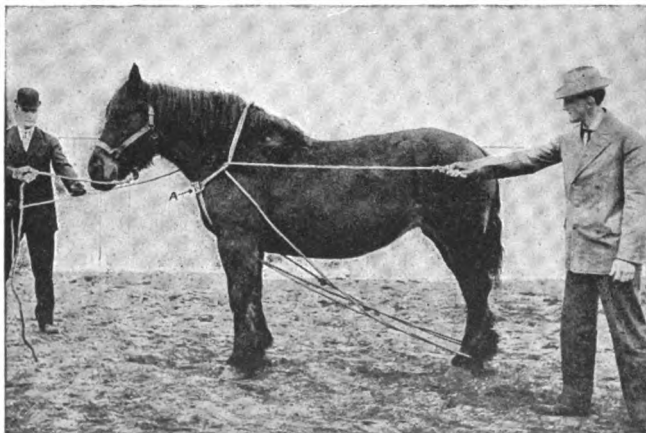


FIG. VIII—A PULLING ARRANGEMENT FOR THROWING A HORSE

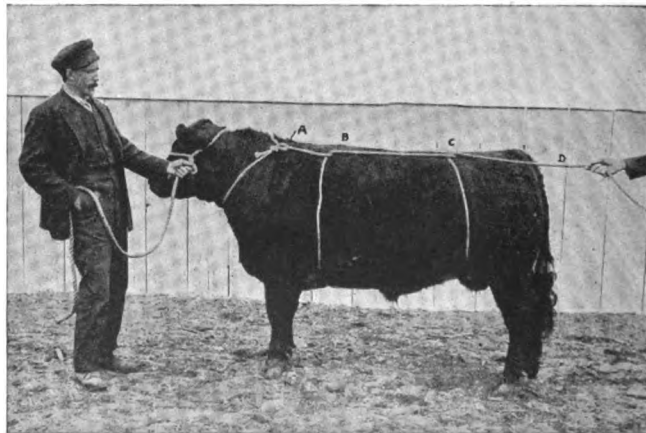


FIG. IX—A ROPE ARRANGED FOR THROWING A BULL OR COW



any soft iron rod will do. The clip is shaped as shown in the engraving, the part at X being bent at right angles and let into the toe of the foot where a recess is cut for the purpose before the shoe is attached. After cutting the recess to admit the end of the toe clip, the shoe is carefully nailed on, using a leather pad, and packing the foot carefully with tar and oakum.

After the shoe is on, take a wad of oakum, coat it heavily with balsam of fir and lay it in the rasped quarter. Fill the wound well with the pad of oakum and balsam of fir. Now put the false toe clip in place and, with a roll of surgeon's adhesive bandage one and one quarter inches wide, wrap the foot carefully. Go round and round the foot until the oakum and balsam of fir pad is well covered. Be sure to draw the bandage tight at each turn around the foot. When sufficient bandage has been applied, seal the end carefully, to prevent unwrapping, and then bend the upper end of the

The Business from a Practical Smith's View-point—3

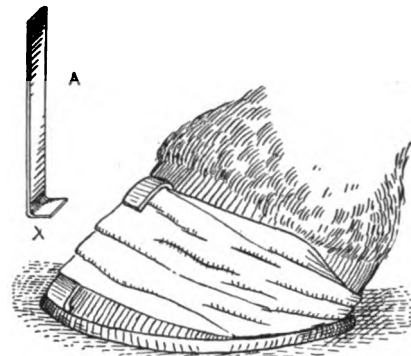
H. M. TOTMAN

Leaks and Their Remedy

It is a question whether there is any other business of equal magnitude where there are as many leaks through which profits disappear as in the blacksmithing business.

First—Work Done, but Not Charged. In a shop employing fifteen men, unless a thorough system is carried on, the aggregate loss from this one leak will amount to hundreds of dollars a year. Only recently the writer was informed by the owner of one of the most complete garages and repair shops in a near city that his loss was considerable on account of neighbors running in at the back door and getting small jobs done which never were charged or reported at the office. To stop this leak we have a special order book in which every job is entered, regardless of size, and the men are instructed not

to the next job when one job is finished. It is the practice of the writer to make up order slips for



A RADICAL CURE FOR QUARTER CRACK

each department every morning to cover the work for the day, so that the men need never ask about the next job. Small work will come in during the day that needs immediate attention, but the practice of order slips for the men will be found a time-saver and, of course, you know that "time is money."

Leak No. 3—Disorderly Shops. Order is heaven's first law, and is very essential here upon earth. A visit to the average custom shop will show a litter of all kinds of material strewn about—scrap iron, bolts and tools—causing unnecessary confusion. When a tool is needed, valuable time is lost in searching for what should be right at hand. I know shops that haven't been thoroughly cleaned up in twenty-five years. Have a place for scrap iron and rubber, and sell it at regular intervals. It means money. Then, too, an orderly, well-kept shop attracts the best trade by its very novelty.

Leak No. 4—Poor Arrangement of Machines, Benches, etc. Plan to have everything handy and have all tools of the very best kind. Buying cheap tools is pure extravagance. Good tools kept in good order will aid in turning work out quicker.

Leak No. 5—Loafers. This is one of the most common and worst leaks we have, and is generally confined to custom shops. Very often our shops are the rendezvous of all the idlers in the vicinity who indulge in story-telling and other conversation to the great injury and loss of the boss. This is a difficult leak to plug when once started. My method is to require every one entering the shop to come through the office first; if he has no business in the shop he doesn't get in. If he wishes

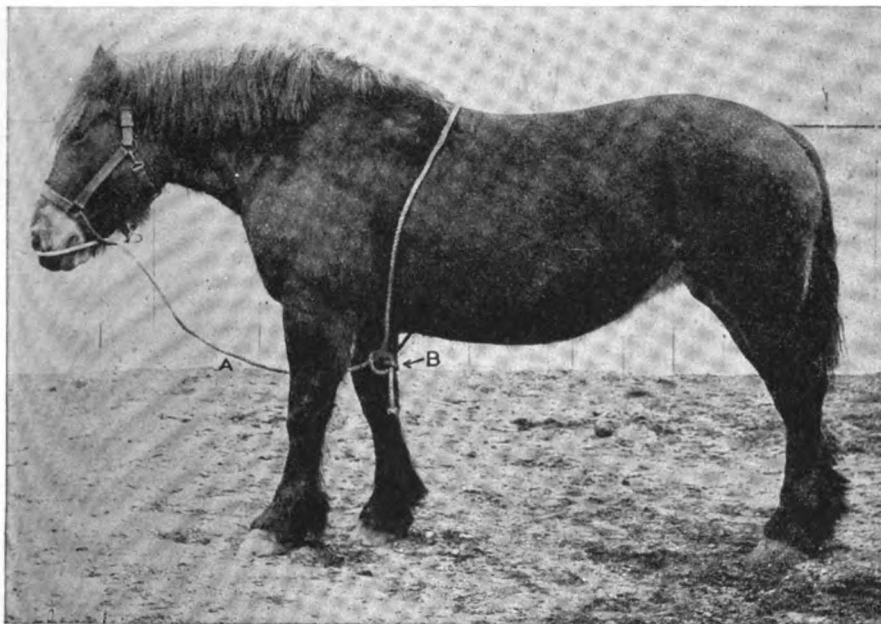


FIG. X—A SIMPLE ROPE ARRANGEMENT USEFUL IN TEACHING A COLT TO LEAD

toe clip over and down on the bandage. Also cut the bandage away at the heels so it will not chaff the bulbs when the horse is in action. The bandage should not measure over half an inch wide at the heels after cutting.

The animal is now ready for the road or street, and if directions have been followed the horse will have a sound foot in thirty days.

to handle a job without an order from the office. Then when the charge slips are collected at night they are compared and checked with the order book. Of course, there is hardly a day in the year but that some jobs have been forgotten to be charged by the mechanic, but this method catches them every time.

Another bad leak is occasioned by men not knowing how to proceed



to see one of the men I call the man to the office. In this way all solicitors, agents, collectors and loafers are shut out.

Leak No. 6—Lost Time. Custom shops rarely make use of a time clock. Many men make a practice of being fifteen minutes late and stopping work at a quarter to twelve to wash up, etc. If ten hours is the rule of the shop a man should give 600 minutes' labor for a day's pay. When pay-day arrives if his envelope is short a quarter of a dollar you'll hear from him. Why should he cheat you out of a dollar and up every week by lost time?

Leak No. 7—Faulty Methods of Bookkeeping. As I devote one of these articles to this subject we will not consider it here, except to say that it is almost universal. The average proprietor thinks it unnecessary to do more than to keep the debit and credit accounts with customers. The real facts to know are what your business is amounting to from week to week. If one did a strictly cash business it would also be necessary to keep a set of books, as will be shown later.

Leak No. 8—Delay in Collecting Accounts. I believe this hits every one of us, and it is the one serious weakness with the writer. We are very apt to push our collecting only when we are pushed by our creditors, and then we look over the list of accounts receivable, and pick out the easy ones, leaving the hard ones for some more convenient time (which never comes). "We are so busy, you know," and the first thing "we know," some one has cleared out or "busted," and then there is another account charged to profit and loss. Meanwhile these accounts get so old that they are almost forgotten by the debtor, and disputes occur, allowances are made (knocking out all the profit), customers are lost and there is dissatisfaction generally. Why not give a definite time limit and require settlements? If any customers object, cut them out as credit risks. The fact is that most of us are cowards and are afraid of our customers. Why not have a frank understanding (without getting angry) by putting the entire question on a simple business basis in a friendly, courteous way? It can be done easier than we imagine. Don't forget that the favor in extending credit is to

THE DEBTOR—NOT TO YOU. Short bills make long friends. The ability to say "yes" and "no" and stick to it is an important factor in business success.

Leak No. 9—Grouchiness. Perhaps the most important factor in business is courtesy, and it doesn't cost you a cent. We have all met men who were so courteous that a

but some houses allow 5% or even 6% in a few cases. A four months' account with 5%—30 days, equals 20% per annum; at 2% it equals 8% per annum. We can well afford to pay the bank 6% per annum and make 8% to 20%. If a man can show his bank a statement of his business that will show it is fairly profitable and he is a man of good



THE PRICE-MAKERS

Which one do you employ? Some smiths employ none at all. The Agreed Price List is better than no Price-Maker, but Cost Accounting is Best. Base your Selling Price upon conditions right in your own shop, *not* upon conditions as found in two or three other shops. Make your own prices, base them on *your own* costs and then stick to them.

favor refused by them left us in a better frame of mind than we are when granted a favor by some surly, grouchy chap who grants it so grudgingly as to leave "a bad taste in one's mouth." We all like to trade with the pleasant clerk. The jobbers recognize this, and their salesmen are usually jolly good fellows. It is a business asset and goes a long way towards counteracting other failings. **TRY IT.**

Leak No. 10.—Neglect in Paying Bills. Only a very few of the custom shops discount their bills payable. If we could only realize that these discounts represent a profit in advance, that in the aggregate for the year amounts to a respectable sum. Two percent is the usual discount,

habits he can generally get a line of credit sufficient to enable him to discount his bills payable. A business of \$15,000 per year will use approximately \$4,000 worth of stock. We can figure an average discount of 3% or \$120. This is velvet, but by no means the only advantage gained. The discounting customer is highly prized by the jobber and receives preference when bargains are offered. Is it not worth while?

Leak No. 11.—Allowing Customers to Dictate Prices. Every one of us has undoubtedly met men who bring in work which is priced when completed, when calling, the customer, whose work has been taken care of according to his orders and instructions, tells us what he will pay. There



are many of this kind. When a discussion of this kind arises I reply as follows: "You state what you want and I'll make the price" or "state what you will pay and I'll do the work accordingly, but you cannot dictate how the work shall be done and what you will pay for it." Run Your Own Business.

Leak No. 12.—Failure to Check Invoices. The writer has worked for more than one hundred different custom shops and never knew of but one shop which made a regular practice of checking and weighing or measuring goods. We do not charge jobbers with being dishonest (although there are such), but mistakes do occur and much more frequently than one would think. We believe it necessary and wise to require a copy of all orders given.

Check the invoice with your copy of the order, then the goods with the invoice; and then only can you be sure that you get what you pay for. Short weight or short measure, errors in footing or in multiplying, are quite common. Be Sure You are Right and Then Go Ahead.

Proper Care of the Forge Fire

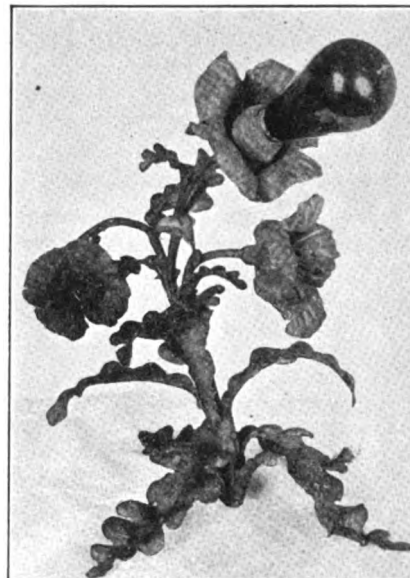
A. E. BACHMAN

There are a great many good points about the all-important question of a proper fire that should be

I had an idea that to be economical with coal it was necessary to have small fires, and the one great mistake I made was not having sufficient fire and heat for my work and not enough coal on to make a good hot fire. Another mistake one makes is to keep stirring the fire with the poker to get rid of the cinders. The proper way is to work until the fire has become almost all cinders, then take a small shovel and the lilly and remove all the coal and coke. The cinders should then be removed and a fresh fire started. It is almost impossible to make a good weld unless you have a good fresh fire, because the ends of the lap of iron are very apt to burn off.

When I first started to work in the shop I could not make a good heat and I was discouraged almost to the point of quitting, but the man with whom I was working consoled me by saying that all beginners had the same trouble and that I would catch on to the right way after a little practice. A few days after this I had a large piece of iron in the fire and I was working between a "sweat" and a "give up." The assistant foreman's fire was next to mine and I noticed that he had a big heat on, so I went over to him and asked how he made his fire. He gave me a little explanation which enabled me to see the point and I then tried to make

iron was "soaked" or ready to take on the welding heat. He then gave it a still stronger blast until he could



AN EXAMPLE OF MR. JAMES CRAN'S ARTISTIC WORK

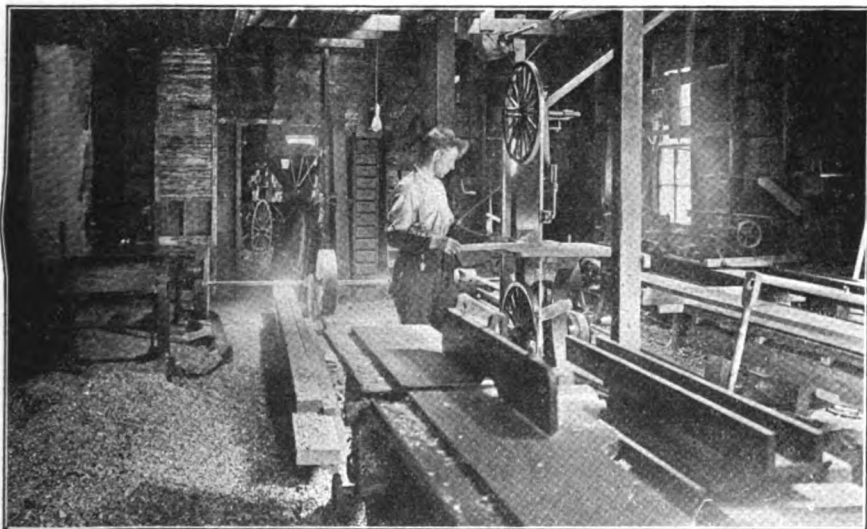
see through the openings of the coal the large drops of iron like beads of perspiration rolling down from the heat (which was a white heat). Next he took a small shovel and the lilly and removed the coke from the iron which enabled him to make a weld clean and solid. When he had finished, the weld was not discernible except for a little blue streak on the iron.

I have found after years of practice that a heat made in this way is the best, even in heating iron down to $\frac{1}{4}$ -inch rod, and I must say that a bake-oven fire gives entire satisfaction.

The Use of Garnishment Proceedings for the Collection of Money

In answering the following letter, written from Auburn, Ind., I can say something about the value of the proceeding which the law calls "garnishment" in collecting money: *Elton J. Buckley, Esq.*

Dear Sir:—Please advise how to go about collecting a debt under the following conditions: I have a claim against a merchant which he practically defies me to collect. He has a stock of goods and fixtures which would probably bring no more than he is entitled to under the exemption laws, so he is sitting down, waiting



THE WOODWORKING DEPARTMENT IN MR. L. C. OLESON'S IOWA POWER SHOP

known by every smith. It is the foundation upon which his work depends. And until he thoroughly understands his fire he will be handicapped in turning out good work.

my fire like his with a little help from him. This is the way he did it: He put on plenty of coke with a good deal of coal all over the iron, then gave it a slow blast until the



to see what I will do. Is there anything I can do? I hate to let the man beat me, but at the present time I see very little chance of doing anything else. I would say that the claim amounts to a little over \$200. Please do not use my name if this is printed.

Respectfully yours,

K.

There is always a chance that a creditor in this position may be able to collect his money by the use of garnishment proceedings. Every State in the Union has a law allowing money due from A to B, to be

money, though with less chance of success, because a consumer is less apt to have people owing him than a merchant. Still, almost everybody usually has *some* money owing to him, and a little shrewdness exercised in smelling it out will frequently yield good returns.

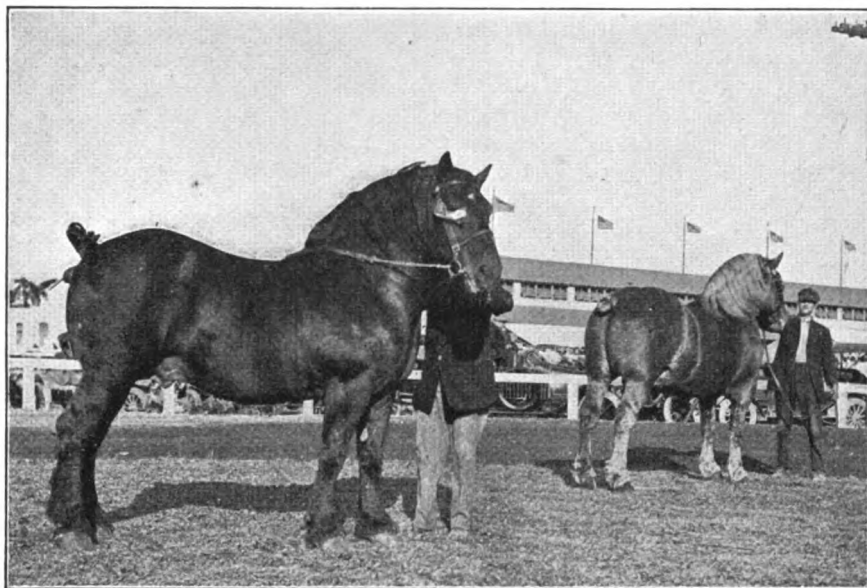
I have a case in mind where the debtor was a retail drygoods dealer. He was indebted to his jobber in about \$3,000, and had become very indifferent to the account, as he had only a stock and fixtures which at forced sale would not have brought

execution was issued against every one, garnisheeing the money which they owed the retailer, and ordering them not to pay it. Altogether about \$650 was seized in that way, with more in sight, when the retailer capitulated and made a satisfactory arrangement for settlement. This gives some idea of the possibilities of the proceeding.

Naturally the debtor's bank account can be made the subject of the same sort of attachment execution, as can any money or property belonging to him but in another's hands. In some States, wages due can be attached also, but these States are in the minority; in most States there is no attachment of wages. Under laws of this type, salaries and commissions are practically always classed with wages.

In some cases the use of garnishment proceedings and all other proceedings of the same kind will be interfered with by other creditors, who will come down on the debtor and put him into bankruptcy when they see you going ahead to collect. But in a surprising number of cases the attachment plan can be used if it is thought of at the psychological moment and used quickly.

(Copyright, 1913, Elton J. Buckley)



PRIZE WINNING BELGIAN STALLIONS OF LARGE PROPORTIONS

garnisheed in the hands of A by C, whom B owes. Sometimes it is called a garnishment law, sometimes an attachment law, but under some name a statute of this character will always be found on the State statute books. It is a godsend to creditors—I have seen thousands of dollars collected through its use that would otherwise have been lost.

Where you have a debtor, especially one who is in business, and he seems to have nothing in his own name except stock, fixtures and other personal property which would about equal the sum allowed him under the exemption laws, it is usually safe to assume that he, too, has customers indebted to him. Attach the sums owed by those persons, and in many cases you have your claim safe. Every dealer except one doing a strictly cash business, can be gotten at in this way.

So, in the same way can a smith get at some customer who owes him

more than the fairly large State exemption. The jobber finally demanded payment, and was ignored. He employed a lawyer in the debtor's town, sued and got judgment. At the psychological moment the debtor filed a claim of exemption, and under this an appraisal was made, and practically his entire stock and fixtures were set aside for him as exempt. This was precisely the way the debtor had figured it all out—none of his other creditors were pushing him, and there could therefore be no bankruptcy proceedings—but he forgot one possibility. The setting aside of the stock and fixtures exhausted the debtor's claim of exemption, and left the jobber free to take the whole of anything more which he might turn up. The local attorney for the jobber was well acquainted with everybody, and it was an easy matter for him to compile a list of the drygoods' man's chief credit customers. This was done, and an attachment

Thoughts on Timely Topics

By THORNTON

Caustic Censure and Cheery Comment

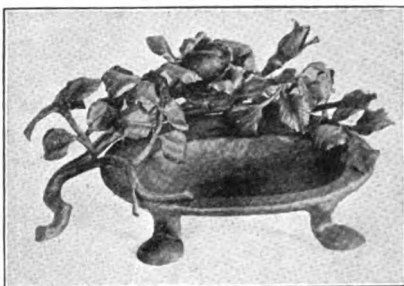
YES, IT'S A NEW YEAR. What are we going to do with it? Here's a year that we've never seen before; a year that is slick and clean; a year without a blot, spot or good deed. What will it show twelve months hence? Here's a pretty good line of thought for everyone it seems to me. Let us all devote some thought to these points at this time.

THEY SEEM TO BE GETTING down to common sense in some sections of our glorious country—seem to be waking up to the right idea. And what I refer to is the application of modern stock-raising ideas to the raising of children. Yes, sir! Folks are getting some sense at last and they are paying a little more attention to the raising of the human animal. In several fairs during the past fall they've not only held livestock shows but baby shows as well. And prizes haven't been pinned on



merely the prettiest decorated, but they were awarded according to real merit; same as cows, horses and stock. And, friend, let me tell you it's about time. When folks, generally, will pay as much attention to the raising of a blue-ribbon winning boy or girl as they do to a blue-ribbon Jersey or a Shropshire pig then we'll have sturdier men and women, and fewer mollycoddles and wishy-washy-willies that don't know their own minds from a limousine with cigarette attachment and a high speed clutch. If thousand-dollar stock is worth all the time, trouble and expense usually devoted to it, isn't a fifteen-hundred-dollar boy or girl worth time and trouble and care, too? Let us devote at least as much time to the development of the 100-per-cent boy and girl as we do to the raising of the 100-per-cent critter.

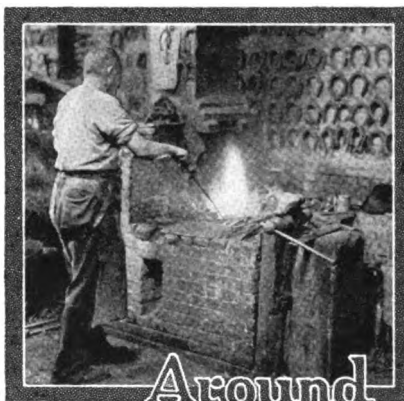
THE AUTOMOBILE REPAIR PROPOSITION seems to be a puzzler to a great many smiths. That is, a great many do not know whether they should take up the work or not. They seem to be on the fence. As one smith said to me the other day: "I don't know whether to go in for the auto work or not. Some smiths say don't and others say do. So I'm pretty much up in the air." As I told this smith it all depends on your own particular case. If you can get automobile work to do, and have space and time or can make space and time for it, by all means do the work. Of course the chances are that at first you won't know a floating axle from a floating kidney, but you've got a better foundation for doing automobile repairing in a workmanlike manner than the average auto-expert who is talking continually about synchronizing the syncopater of the thing-a-ma-bob with the what-you-may-call-em, and who really doesn't know a piece of carbon steel from a lead pipe. And it is really pitiable at times to listen to the ignorance displayed by some of the auto-experts. They leak at the mouth, like an old-fashioned syrup-barrel nozzle, and what they give out as knowledge, is just about as valuable as the drippings from a syrup barrel after they've run over the cellar floor. Some time ago I listened to an auto know-it-all who explained to a group of willing listeners that: "The gears for our cars



ANOTHER EXAMPLE OF MR. CRAN'S WORK

are all case-hardened first in the blank and then cut. We use nothing but pre-hardened cut gears." Of course he didn't mean any such thing at all, but his pre-hardened, copper-riveted dome of infantile intelligence didn't know any better. Don't be afraid of the auto-repair proposition if you can get the work to do. It's profitable, it's easy—and you can get the necessary know from a good collection of books.

SOME FOLKS are working so hard to earn a living that they forget to live.



Around Our Forge Fire

"How'd you know I wanted to see you this morning, Benton?" greeted the Editor as the Recipe Man entered and established himself in his favorite chair.

"I didn't know it," replied Benton. "But seeing you did want me, why I'll just accept a cigar and talk between puffs"; and the man of recipes helped himself to a cigar and after lighting it sat back to enjoy his smoke.

"I didn't want you merely for the purpose of smoking up my cigars," returned the Editor. "I want your help on several matters here, and if you'll get out that recipe book of yours I'll let you know what I want or rather what some of 'Our Folks' want."

Then picking up a letter from a pile on his desk the Editor read: "I am looking for a good cement for stopping leaks. I am working for a company that has a great deal of trouble with leaks in their piping, and a good cement that will harden under water will be of considerable value to me in repairing some jobs temporarily

or until the work can be done right." "That is from a reader down in Pennsylvania," finished the Editor.

Benton was busily turning the pages of his recipe book. Finally he stopped: "Here is something that will fit that case like a glove. And one big advantage of this recipe is that it isn't complicated. All that is necessary is to secure equal parts of litharge, glycerine and Portland cement and mix them. This cement is good for stopping leaks, it will harden under water and can also be used for cementing brass and glass. Seems to me it would be a good thing to keep handy in a general repair shop, too."

"Here's a man asks about the use of salt for heating pieces to be hardened or annealed. What can you tell him, Benton? I know it is sometimes used" added the Editor, "but what does your book say?"

"Why, I ran across that salt stunt here awhile ago," returned Benton, hunting through the pages of his recipe book. "I made a note of it, too. I think it was Sam Keeton—yes, here's his name to this note. He says he uses the salt bath for heating, and because of its simplicity prefers it to the lead bath. He uses fine salt, places the articles in it and then heats to the desired temperature." Then, continuing, Benton said: "Keeton didn't mention this, but I would think that salt would be an excellent thing in which to anneal steel. For example, suppose the articles were placed in the salt, heated up and then allowed to remain in the solution until cold. Seems to me that would have very near the desired effect."

"Yes, Benton, it sounds reasonable;—suppose you try it out the next time you have a chance," suggested the Editor. Then taking up another letter he said, "Here's an owner of a power shop who wants to know how to make a good belt dressing—something that will not only make his belts pull but will also keep them pliable and prevent slipping."

"There are an almost unlimited number of recipes for belt dressings, but here's one I got hold of the other day from a man who has charge of the belts in a shop down near the river. He recommends it especially as an anti-slip dressing. He takes eight ounces of Venice turpentine, one half ounce of tallow and one ounce of good lard oil. This man says he's been using it for some time with very satisfactory results."

"Here's a man who wants a formula for making a compound to prevent the rusting of machinery. He says that his machines, because of the natural dampness of the air in his locality, are rusting badly, and he wants to know if there isn't something he can put on them."

"Yes, I got a recipe from Bill Cruver the other day," and Benton read from his book. "Take one pound of lard and, after melting it, dissolve one ounce of camphor in it. When all is dissolved skim the dirt from the top of the liquid and add enough fine graphite to give color to the mixture. The machines to which the solution is to be applied are then thoroughly cleaned and the mixture smeared on. After two days rub the machines clean with a soft cloth, and rusting will be prevented for a long time."

"That is just the thing this man is looking for, Benton," complimented the Editor. "And inasmuch as you have come close to passing 100 per cent in our questions this morning, suppose you force another cigar upon yourself and come out and have some lunch."

To all of which Benton heartily agreed.



Wanted: A Job

W. O. B.

[The final completion of the canal at Panama will throw out of existence an organization whose accomplishments sink all other engineering feats into insignificance. The canal builders will be out of a job because there's "no opening" big enough. The work they accomplished, the obstacles they overcame and the repeated and numerous discouragements that seemed but to encourage those toilers of the "ditch" to still greater effort can never be fittingly described.]

Wanted: a job that they say can't be done.
It may have been started or not yet begun.
A job that is tough, a hard nut to crack.
A Gibraltar in jobdom, where problems don't lack.
A corker, a hummer, a slashin' big trick.
A bloomin' ol' buster as hard as a brick.
A teaser with problems as big as the earth,
Where men who are workers can show their real worth.

*We found hell loose on the Isthmus—
The demons of death in command
Cut deep in the ranks of the coolies,
Left few of their ditch-diggin' band.
We found piles of bones there a whitenin'
Under the glare of the sun.
But we cleaned up the place
And ran a fair race
With the demons of hell, but—we won.*

Wanted: a job, where workers can work,
Where hustle is needed and no one to shirk,
Where something impossible's got to be done,
And graft is taboo, but credit is won.
A job where the face of the earth's to be changed,
Where history's to be made or the map rearranged.
A job where the workers can toil night and day.
Some job that's stumped others despite extra pay.

*We made the dirt fly on the Isthmus—
We set up a pace that would kill
The Frenchies or even the others
In cutting down Empire Hill.
We busted all records for diggin',
And eight thousand tons in a day
Was like hummin' a song
For our dirt-diggin' throng.
They'd a-dug thro' t' hell on a say.*

Wanted: a job; some big thing t' put through.
Some work the whole world's been trying to do.
A big undertaking as big as the earth.
Where set-backs abound we show our worth;
A job that is dead or maybe not born,
A big proposition—a hope, but forlorn;
A huge undertaking that staggers the land—
The bigger the better for our ditch-diggin' band.

*We mussed up the map on the Isthmus;
We changed the whole lay of the land;
Tamed the hills, rivers, lakes and the mountains
Till they fed from out our hand.
We linked the great oceans together—
A cinch for our ditch-diggin' mob—
But now that it's done,
Where under God's sun
Is another such slashin' big job?*



Heats. Sparks, Welds

Better shop talk than sharp talk.

Don't lay this paper aside without reading "The Past Year" on the page of "Timely Talks."

Efficiency is the watchword of this century. How about that old scrap-pile lying in the corner?

The blacksmith who reads does not look for profits with a microscope—he installs a bookkeeping system.

No man knows all there is to be known about blacksmithing. Let us all get together and learn from each other.

We have horseless wagon, wireless telegraph, painless dentistry, why not more sootless smith-shops?

Any horseshoer can shoe a horse—that's his business—but it takes a horseshoer with brains to shoe a horse correctly and with profit.

The amount of brains—real hard thought—that you put into your work determines the amount of pleasure and profit you will get out of it.

"Better to go to bed having dined on a dry crust than to rise in debt." That wouldn't be so bad, as a "no credit" sign to hang up.

Exposing the skin by clipping the fetlock often causes scratches during the wet season. Long hair at the fetlock is natural—let nature protect the part as intended.

A good time is right now, to get on that Honor Roll. A ten-year subscription will save you half your subscription money and put your name right up amongst the leaders.

The successful blacksmith is the one who can and will make use of the experience of others—who has the courage to discard his own errors and to profit by the truths of others.

Let us know just exactly what you think of our new headings. Styles in printing change, as well as in dress, and this is just about the newest idea. How do you like it? We must keep up to date—and there's nothing too good for THE BLACKSMITH.

"It's better to pound an anvil and make a good horseshoe than to pound a pulpit and make a poor sermon." Be continually striving to make a better shoe, or a better vehicle. By conscientiously observing your work you can make the best.

"Money begets money, and its offspring begets more," said Ben Franklin, but he didn't say a word about putting money

into wild-cat schemes or get-rich-quick ventures. Many foolish persons have closed a bank account by putting their money somewhere else, in the hope of getting rich quickly. "Better be safe than sorry."

Electricity is used for many purposes, but perhaps the most curious use for the current is that of aging cheese. An electrician of Holland has discovered that during a period of 24 hours he could age a perfectly fresh cheese. A fresh cheese after being subjected to an alternating current for 24 hours shows all the consistency, taste and appearance of a fine cheese that has been stored and carefully treated for two years.

The first lightning rod was not invented by Ben Franklin, contrary to popular belief. The first rod was invented by a poor monk in Bohemia. He put up the first lightning rod in June, 1754. But his enemies, jealous of his success, incited the neighboring peasants against him, and under pretext that the rod was the cause of the excessive dry weather they had the rod taken down. The inventor was imprisoned.

"The horse is still with us," says The Pioneer Pole and Shaft Company, referring to a clipping from the *Chicago Tribune* showing a compilation of one day's traffic in the downtown streets. According to these figures, the total number of horses counted on eight downtown streets during one day of 1913 was 22,480, while in 1907, 24,249 were counted in one day. The number of automobiles on the same streets amounted to 1,103 in 1907 and to 7,398 in 1913. This seems to show that the horse "ain't went yet."

A Suggestion

Do your accounts account?

Do you know your business as you should?

If not, is this not a good time to begin—to make your books valuable assistants and contributors to your success rather than the bugbear of your business?

THE AMERICAN BLACKSMITH is always ready to assist you to make more money.

An oil well opened at Baku, Russia, while a success, ruined the company because of the damage it caused. The oil strata was suddenly tapped at a depth of 570 feet. With a roar that could be heard for miles the gas blew off. A terrific blast of oil followed the gas after some minutes, blowing the derrick into the air, and a jet of oil and sand rose 200 feet. For two months this monster flowed unchecked, the oil forming lakes and rivers, until it is estimated five million dollars' worth of fluid had gone to waste. Government engineers were finally appealed to and after much unsuccessful work they finally succeeded in capping the well.

There was trouble enough and to spare over at Friend Tardy's the other day. It seems that Tom had gone to the corner wet-goods emporium, and while he was away the scrap-man called. He looked 'round a bit, weighed up a small pile of old shoes and then proceeded to clean up the shop. He had just gotten the old anvil, the rusty drill press and two old vices into his wagon when Tom returned. The air was blue for several minutes and Tom was hopping mad. But the scrap-dealer said he guessed he knew his business and he certainly knew scrap and junk when he saw it. But, of course, Tom wouldn't sell the stuff, though goodness knows the tools are old enough to be retired.



Our Honor Roll

Fifty-Two

Fifty-two new names were placed on "Our Honor Roll" this month. And two of those names jumped right up into the 1924 class. But there is still plenty of room at the top, and the 1924 class is easy to get into. For example: if your subscription expires this month—January—send \$5.00 (\$7.00 from Canada or 1£ 14 sh. in other countries) and we will give you ten full years' credit; mark you, paid up to January, 1924, and place your name on Our Honor Roll right up among the leaders. Just notice the saving you can make.

U. S. and Mexico	Canada	Other Countries
2 yrs. \$1.60 save \$.40.....	2.00 save \$.50.....	10 sh. save 2 sh.
3 yrs. 2.00 save 1.00.....	2.70 save 1.05.....	14 sh. save 4 sh.
4 yrs. 2.50 save 1.50.....	3.20 save 1.80.....	18 sh. save 6 sh.
5 yrs. 3.00 save 2.00.....	3.75 save 2.50.....	1 £ save 10 sh.
10 yrs. 5.00 save 5.00.....	7.00 save 5.50.....	1 £ 14 sh. save 1 £ 6 sh.

Send your order and remittance now—today. Don't wait until you forget all about it. You'll never regret it. Our subscription insurance saves you money. The sooner you begin saving the more you save. There is no time better than NOW.

NAME	Subscription Paid to	NAME	Subscription Paid to
W. C. WATT, Kan.	Dec., 1930	C. WILLIAMS, W. Aus.	Mar., 1919
WADDINGTON FARM, W. Va.	Mar., 1928	R. TAYLOR, N. Zealand.	Feb., 1919
I. J. STITES, N. J.	Jan., 1928	G. E. HARDCASTLE, N. Y.	Nov., 1918
A. BOSCH, N. Y.	Mar., 1924	W. VALLANCE, N. Y.	Nov., 1918
F. JACOBS, Ohio.	Feb., 1924	C. ZIEHR, Iowa.	Nov., 1918
E. H. TROYKE, Ill.	Dec., 1923	CYCLONE GATE & FENCE CO., S. Africa.	Oct., 1918
J. BAILEY, Mar.	Dec., 1923	W. ALSON, Minn.	Oct., 1918
F. WATKINS, N. H.	Nov., 1923	H. P. BOWERMAN, N. D.	Oct., 1918
W. B. ABELL, N. Y.	Oct., 1923	J. DELANE, Neb.	Oct., 1918
W. R. TURNER, Mar.	Oct., 1923	J. F. BAGGETT, Queens.	Sept., 1918
C. NELSON, Neb.	Sept., 1923	P. J. THORNEYCROFT, N. W. Ter.	Sept., 1918
O. W. TAYLOR, Pa.	Aug., 1923	W. A. THUGE, Queens.	Sept., 1918
S. EFFENHAAR, S. Africa.	July, 1923	A. L. VARRIE, S. Africa.	Sept., 1918
G. L. DEWITT, Mont.	July, 1923	GEO. A. PETTY, Utah.	Sept., 1918
W. W. GREGG, Tex.	July, 1923	G. W. HANLEY, Pa.	Sept., 1918
O. C. YOUNG, Mich.	June, 1923	C. WALTER, Ore.	Sept., 1918
OTTO SUPPEL, Penn.	June, 1923	T. B. HOLT, Okla.	Sept., 1918
A. CHAPMAN, N. Y.	June, 1923	ROBERT COOK, Ky.	Sept., 1918
C. BIRLEY, Md.	June, 1923	A. B. WENDLANDT, Wash.	Sept., 1918
F. H. SHUPP, Penn.	June, 1923	A. J. BROOKMAN & Co., Vic.	Sept., 1918
J. C. STOVER, Penn.	Apr., 1923	PETER COOKS, W. Aus.	Sept., 1918
W. SCHOONOVER, Penn.	Apr., 1923	R. J. TOMPKINS, Texas.	Sept., 1918
J. B. RUNNIE, Iowa.	Mar., 1923	J. VASCETTI, Colo.	Aug., 1918
LOWMEALS BROS., Mo.	Mar., 1923	E. C. PUXTON, So. Aus.	Aug., 1918
J. CARSWELL, Ark.	Mar., 1923	V. D. SIBLEY, B. C.	Aug., 1918
G. E. GLASSER, Ohio.	Mar., 1923	L. SMITH, Cal.	Aug., 1918
T. BRADLEY, N. S. Wales.	Mar., 1923	W. CRIBB, Queensland.	Aug., 1918
I. T. NEEDHAM, Ill.	Feb., 1923	GEO. REID, S. Africa.	Aug., 1918
G. C. DISINGER, Miss.	Feb., 1923	H. KELENBENZ, N. J.	Aug., 1918
J. HUGHES, Ohio.	Feb., 1923	W. D. BRADFORD, Cal.	Aug., 1918
J. WEBBER, Minn.	Jan., 1923	A. DISCHER, Aus.	Aug., 1918
Z. A. ENOS, Kan.	Jan., 1923	GILBERT BROS., S. Aus.	July, 1918
W. G. WISE, Cal.	Jan., 1923	A. MACKENZIE, W. Aus.	July, 1918
F. S. BISHOP, S. Africa.	Jan., 1923	GEO. DASH, N. Zealand.	July, 1918
S. P. HARNETT, Mont.	Dec., 1922	C. R. OLIVER, S. Africa.	July, 1918
W. BRICKNER, Okla.	Dec., 1922	L. G. REID, S. Africa.	July, 1918
J. PABIAN, Neb.	Dec., 1922	W. M. PURYEAR, Ala.	June, 1918
P. FREDERICKSON, Iowa.	Nov., 1922	THOM & VESTER, S. Africa.	June, 1918
L. O. LEVINE, Ill.	Nov., 1922	L. LACASTE, Que.	June, 1918
W. LAWSON, N. Z.	Nov., 1922	WRIGHT & SON, Texas.	June, 1918
W. H. MILLER, Iowa.	Oct., 1922	ALBERT MELLUM, N. D.	June, 1918
A. O. MARTIN, Idaho.	Sept., 1922	J. LINDSAY, S. Africa.	June, 1918
O. A. MORTIMER, Idaho.	Sept., 1922	J. H. GIBBS, S. Africa.	June, 1918
H. J. WYATT, Wash.	Sept., 1922	W. W. BRIDGES, Ark.	June, 1918
J. N. SKOW, Iowa.	Sept., 1922	MATHESON BROS., Iowa.	May, 1918
A. D. STANDFORD, Wash.	Sept., 1922	ED. HOLLAND, Queens.	May, 1918
T. TINKER, Que.	Sept., 1922	H. L. HASWELL, N. C.	May, 1918
A. PFEIFFER, Ohio.	Aug., 1922	E. KOPFER, Wis.	Apr., 1918
W. D. VALENTINE, Iowa.	Aug., 1922	J. H. MARTIN Mfg. Co., Ind.	Apr., 1918
G. HOFFMAN, N. Y.	July, 1922	H. S. WATNE, S. Aus.	Apr., 1918
J. ERMAN, Ark.	July, 1922	H. S. YOUNG, Wash.	Apr., 1918
W. K. W. HANSEN, Pa.	June, 1922	W. WELLS, N. D.	Apr., 1918
ROBERT TOCHTER, Cal.	June, 1922	W. H. CHIPMAN, Mo.	Apr., 1918
J. VAN MARTER, N. Y.	June, 1922	A. P. STROBEL, N. Y.	Apr., 1918
E. ANDERS & SON, S. Aus.	May, 1922	E. H. ALBERTY, Pa.	Apr., 1918
LOUISA CARRIAGE WKS., Va.	May, 1922	J. R. JEFFRIES, Pa.	Apr., 1918
S. SMITH, Tex.	Apr., 1922	R. COLVIN, Ind.	Apr., 1918
J. W. HAAR, La.	Mar., 1922	J. LIPPERT, Ill.	Apr., 1918
E. A. DILLON, Nev.	Mar., 1922	OTTO TIEZT, S. Africa.	Apr., 1918
D. W. SMITH, R. I.	Mar., 1922	FLA. AG. & MACH. COL.	Mar., 1918
D. F. KUMTER, Wash.	Mar., 1922	J. V. FISH, Ill.	Mar., 1918
G. F. JOHNSON, Mich.	Feb., 1922	H. J. FISHER, Mich.	Mar., 1918
R. H. KITTLE, Iowa.	Jan., 1922	GEO. SMITH, N. Z.	Mar., 1918
O. M. JOHNSON, Minn.	Oct., 1921	AUG. HOLNAGEL, Ore.	Mar., 1918
H. FELDUS, Neb.	Sept., 1921	A. E. UHRLING, Wis.	Mar., 1918
W. K. KLINE, Kan.	May, 1921	J. C. YOUNG, Pa.	Mar., 1918
F. NORRIS, Yukon Ty.	Jan., 1921	D. C. HOUCK, Ohio.	Mar., 1918
J. L. JESTER, Mo.	Jan., 1921	JOHN EYRE, Neb.	Mar., 1918
R. S. CHISLER, Ky.	Jan., 1920	J. S. STAPLES, Ohio.	Feb., 1918
ED. GRIMM, Tex.	Mar., 1920	S. J. BOYD, Idaho.	Feb., 1918
T. P. CONNORS, Mass.	Dec., 1920	J. MOLITOR, Ill.	Feb., 1918
R. RAMACH, N. W. Ter.	Nov., 1919	F. P. FELLOWS, N. Y.	Feb., 1918
J. NAIMSMITH, N. Zealand.	Nov., 1919	J. W. STEADMAN, Ohio.	Feb., 1918
F. UNDERWOOD, S. Africa.	Aug., 1919	J. P. HOLZAPFEL, Penn.	Feb., 1918
THEO. PASCHEK, Neb.	Apr., 1919		
I. M. TOWNSEND, Cal.	Apr., 1919		
G. BINE, Fiji Islands.	Apr., 1919		

NAME	Subscription Paid to	NAME	Subscription Paid to
E. N. GATES, Vic., Aus.	Feb., 1918	C. BOULTON, N. S. Wales.	Mar., 1917
RENTON WAGON WKS., Wash.	Feb., 1918	C. A. HAWKINS, Ore.	Mar., 1917
WRITING FDT. EQUIP. Co., Ill.	Feb., 1918	A. L. MONTGOMERY, W. Va.	Mar., 1917
J. P. KORNIG, S. Dak.	Feb., 1918	J. PETERSON, Ia.	Mar., 1917
RICHARD BRENNER, Tex.	Feb., 1918	J. ANDERSON, Tas.	Mar., 1917
W. F. HILL, N. C.	Feb., 1918	A. J. NEILL, Vt.	Mar., 1917
P. SHURMIDIN, Cal.	Jan., 1918	ED. DETTRICH, Ind.	Mar., 1917
J. B. BETTEL, Me.	Jan., 1918	LEWIS CHASE, N. Y.	Mar., 1917
W. MISGABLE, Queen, Aus.	Jan., 1918	E. O. LEE, S. Dak.	Mar., 1917
S. PORTELANC, Que.	Jan., 1918	S. STEMPLER, Ohio.	Mar., 1917
D. C. FOLEY, Cal.	Jan., 1918	R. S. GUIGHER, Kan.	Mar., 1917
GLEASON BROS., La.	Jan., 1918	J. S. HASKELL, Col.	Mar., 1917
C. E. KRUG, Wis.	Jan., 1918	W. L. ROARK, Tex.	Mar., 1917
G. E. WOODARD, Kan.	Jan., 1918	A. R. BARLOW, Tex.	Mar., 1917
P. J. DALLY, W. Aus.	Jan., 1918	C. A. WHITAKER, Ohio.	Mar., 1917
J. MORROW, Pa.	Jan., 1918	B. P. CARMY, Ill.	Mar., 1917
G. M. SEYMOUR, Ill.	Dec., 1917	T. J. DORRIS, Conn.	Feb., 1917
J. TEMPLETON, Scotland.	Dec., 1917	F. MARSH, Mich.	Feb., 1917
F. PROCTER, Tas.	Dec., 1917	J. H. WHITE, N. H.	Feb., 1917
J. G. JOHNSON, Ill.	Dec., 1917	McGOWAN BROS., N. Y.	Feb., 1917
F. E. EGGLE, Ohio.	Dec., 1917	J. W. HAUGHT, Ill.	Feb., 1917
C. T. FORRESTER, Cal.	Dec., 1917	IRVING BROS., N. Y.	Feb., 1917
THEO. BUSH, N. Y.	Dec., 1917	W. H. SCHENE, Neb.	Feb., 1917
J. T. ELLIOTT, Ill.	Dec., 1917	A. J. H. WEGENER, S. Africa.	Feb., 1917
J. VOELPEL, Ill.	Dec., 1917	H. SCHNETTE, Ill.	Feb., 1917
W. J. MAIN, Cal.	Dec., 1917	E. DOUGHERMAN, Ohio.	Feb., 1917
G. J. LAUER & SONS, Mo.	Dec., 1917	CHAS. F. GIERKE, N. Mex.	Feb., 1917
MESS BROS., Victoria.	Dec., 1917	M. E. GOLLER, Pa.	Feb., 1917
E. BLOOMER, Aus.	Dec., 1917	J. POTTHOFF, Neb.	Feb., 1917
H. P. ANDERSON, N. Zealand.	Dec., 1917	G. M. GARRETT, Mich.	Feb., 1917
G. E. BARTLE, Wash.	Nov., 1917	ERNEST FINLEY, Pa.	Feb., 1917
F. FROELICH, Tex.	Nov., 1917	A. TILLMAN, Cal.	Feb., 1917
J. A. SHEPARD, N. Y.	Nov., 1917	WALKER BROS., N. Z.	Feb., 1917
McMILLAN, HEAD & Co., S. Africa.	Nov., 1917	G. W. WHITTINGTON, W. Va.	Feb., 1917
C. ANDERSEN, Queens.	Nov., 1917	J. H. HOYLE, S. Africa.	Feb., 1917
J. KILGOUR, Scotland.	Nov., 1917	F. ROSCHY, Pa.	Feb., 1917
K. R. TOMLINSON, Kan.	Nov., 1917	AUGUST MILLET, Ill.	Feb., 1917
KAYS & AINLEY, Eng.	Nov., 1917	C. P. ROBERTSON, S. Africa.	Feb., 1917
T. H. ZINGLER, Wis.	Nov., 1917	O. DANNEMAN, Minn.	Jan., 1917
SCHOLLER BROS., Ind.	Nov., 1917	S. HETEM, S. Africa.	Jan., 1917
E. M. WURSTER, Mich.	Nov., 1917	G. A. GURLEY, Ore.	Jan., 1917
S. Z. FREY, Ind.	Nov., 1917	F. K. WADE, Me.	Jan., 1917
B. A. STEINKE, Ohio.	Nov., 1917	L. V. SENN, Neb.	Jan., 1917
N. B. BATEGATE, N. Dak.	Nov., 1917	S. H. AUSTIN, N. Y.	Jan., 1917
W. H. HOUGHTON, Pa.	Nov., 1917	H. KAIL, Ia.	Jan., 1917
G. W. BOOKE, La.	Oct., 1917	J. H. BERGEN, Kan.	Jan., 1917
C. R. WALTERS, Ill.	Oct., 1917	F. G. A. WILLIAMS, S. Aus.	Jan., 1917
S. SMITH, S. Aus.	Oct., 1917	J. G. BAUER, N. D.	Dec., 1916
W. STAFFEN, Queens.	Oct., 1917	J. CLASSEN, Ore.	Dec., 1916
W. T. CUTKOMP, Iowa.	Oct., 1917	J. C. CRANN, Va.	Dec., 1916
GEO. POTSCHEK, Mo.	Oct., 1917	T. J. DECKER, Va.	Dec., 1916
J. W. RAPS, N. Y.	Oct., 1917	G. FOREST, Mass.	Dec., 1916
W. C. RONEY, Pa.	Oct., 1917	A. E. HANLOTH, Ore.	Dec., 1916
N. N. MILLER, Ky.	Oct., 1917	A. E. HIGBEE, Ind.	Dec., 1916
EMIL PLATE, N. D.	Sept., 1917	M. JAGO, N. J.	Dec., 1916
F. STAUB, Ohio.	Sept., 1917	KOGER PEA & BEAN THRESHER Co., Tenn.	Dec., 1916
B. T. LARSON, Minn.	Sept., 1917	G. JONES, Ore.	Dec., 1916
H. SCHOONOVER, N. Y.	Sept., 1917	L. MAIER, Neb.	Dec., 1916
PERFECTION SPRING CO., O.	Sept., 1917	A. F. MIDDLEBRANDT, Mich.	Dec., 1916
W. A. WILSON, N. Z.	Sept., 1917	J. B. NIX, Ill.	Dec., 1916
R. ROSS, N. S. Wales.	Sept., 1917	G. H. PARKER, N. H.	Dec., 1916
I. E. SPROUD, Me.	Sept., 1917	A. H. PERGANDA, Ill.	Dec., 1916
FRED. BLOOM, Tex.	Sept., 1917	W. A. REAGAN, Pa.	Dec., 1916
R. E. MATTOX, Va.	Aug., 1917	G. SCHENK, Okla.	Dec., 1916
C. T. WOOD, Kans.	Aug., 1917	J. C. SMITH, Wash.	Dec., 1916
GEO. B. HEATON, N. J.	Aug., 1917	N. TOMBLEY, Minn.	Dec., 1916
CLARK & FAUSETT, Queens.	Aug., 1917	L. R. VIRDEN, Colo.	Dec., 1916
C. L. HOCKETT, Cal.	Aug., 1917	E. WILLIS, Colo.	Dec., 1916
H. C. STENKEL, Tex.	Aug., 1917	E. E. TRINE, Pa.	Dec., 1916
M. DEJAGER, S. Africa.	Aug., 1917	B. S. CASEY, Mass.	Dec., 1916
F. HOWARD, Kan.	Aug., 1917	W. DENNER, Mo.	Dec., 1916
H. FERREL, Ill.	Aug., 1917	J. B. SCHIEDLER, Ind.	Dec., 1916
J. MCMEIKEN, N. Z.	Aug., 1917	F. KUMMER, Ohio.	Dec., 1916
F. H. GIERKE, S. Aus.	Aug., 1917	ALFRED CASE, N. Z.	Dec., 1916
A. L. PITTINGER, Ill.	Aug., 1917	H. GRIMM, Utah.	Dec., 1916
F. SPINKE, England.	July, 1917	A. H. GOODING, S. Aus.	Dec., 1916
J. P. KELLY, Md.	July, 1917	LEONARD SMITH, N. J.	Dec., 1916
F. G. STONE, S. Africa.	July, 1917	C. F. SHAW, Mar.	Dec., 1916
V. J. DEVONKERS, N. Z.	July, 1917	W. EDWARD, Pa.	Dec., 1916
H. J. HUBBARD, N. Y.	July, 1917	W. W. EOLY, Pa.	Dec., 1916
J. C. SKINNER, Viet.	July, 1917	JOE. BOTYER, Mich.	Dec., 1916
A. FASNACHT, Tenn.	June, 1917	J. WILLIAMS, N. S. Wales.	Dec., 1916
H. A. CHEEVER, N. H.	June, 1917	J. H. W. SCHNEIDER, Cal.	Dec., 1916
D. SHAFER, N. Y.	June, 1917	W. SAUER, Minn.	Dec., 1916
W. R. GELLING, S. Africa.	June, 1917	F. F. DARLING, Cal.	Dec., 1916
J. H. BAKENBERG, S. Africa.	June, 1917	CHAS. NEWLAND, Cal.	Dec., 1916
A. R. HALLENBECK, N. Y.	June, 1917	J. T. BRAHM, Ia.	Dec., 1916
F. C. BOCK, Neb.	June, 1917	P. H. ST. LOUIS, Wis.	Dec., 1916
W. S. SULLIVAN, La.	May, 1917	A. E. NICKOLS, Okla.	Dec., 1916
H. SMITH, Queensland.	May, 1917	C. J. HALL, Wash.	Dec., 1916
P. VANDERHEAGEN, Mich.	May, 1917	BOB FRICKE, Ala.	Dec., 1916
YOST & HALVORSON, Minn.	May, 1917	JOERIS BROS., Tex.	Dec., 1916
W. MCCOY, Kan.	May, 1917	R. CLEMENS, Conn.	Dec., 1916
A. GUNTTLER, Tex.	May, 1917	SCHREFFLEY & SCHMITT, Pa.	Dec., 1916
C. F. J. LORENS, N. Y.	May, 1917	A. BRAUSE, Ohio.	Dec., 1916
A. DATWYLER, Ohio.	May, 1917	J. E. BEATTY, Mo.	Dec., 1916
E. T. HOGMAN, Conn.	Apr., 1917	GEO. CASSIE, Scotland.	Dec., 1916
O. F. MATSON, Utah.	Apr., 1917	JOHN KAIN, Ky.	Dec., 1916
F. PETTIT, Okla.	Apr., 1917	F. W. HOWELL, Ill.	Dec., 1916
H. G. MARIOTT, Utah.	Apr., 1917	J. ROBERTSON & SON, Scot.	Dec., 1916
E. THIRNAUDAU, Wis.	Apr., 1917	G. C. BEERS, N. Y.	Nov., 1916
W. PICKERING, S. Africa.	Apr., 1917	W. BRACKEN, Minn.	Nov., 1916
ED. BURROWS, England.	Apr., 1917	C. FREDENBURG, N. Y.	Nov., 1916
L. KAUSCH, Wis.	Apr., 1917	F. KOLARIK, Ia.	Nov., 1916
J. M. BROWN, Tex.	Apr., 1917	G. KUGLER, Neb.	Nov., 1916
P. PFEIFFER, Ore.	Mar., 1917	E. J. MANION, N. Y.	Nov., 1916
W. WATSON, Va.	Mar., 1917	J. MASON, Ill.	Nov., 1916
W. BAGLEY, Mass.	Mar., 1917	J. R. MOREHOUSE, Cal.	Nov., 1916
B. E. CAMPBELL, Mass.	Mar., 1917	G. RAYMAN, Ind.	Nov., 1916
R. RUFFER, Ill.	Mar., 1917	J. R. WALKER, Ind.	Nov., 1916
G. STANKE, Wis.	Mar., 1917	J. CARTER, Pa.	Nov., 1916
W. H. MILLER, Mo.	Mar., 1917	G. E. DEIDRICK, N. Y.	Nov., 1916
J. C. WOODS, W. Aus.	Mar., 1917	W. H. HARDING, Neb.	Nov., 1916
		J. MEIER, Minn.	Nov., 1916
		Z. N. REED, Wash.	Nov., 1916



The Seeker Is the Receiver

ELBERT HUBBARD

We live in an age of investigation and interrogation, hence the success of the man who furnishes the truth and those who absorb it.

We are beginning to see into and through things, and it's a case "if you don't see what you want, ask for it"—that's right. If you get more than you want of the wrong sort, that's right, too—it's a part of your education!

The boot has boosted many a man—some folks need firing to fire their imagination.

And when you have no imagination and no initiative, you are led—also lead—you don't radiate.

It is this imagination, fancy, gift of visioning, that spells success. The dreamers are the workers.

"I could be bounded in a nutshell were it not that I have had dreams," said Hamlet.

The reason we see so many peanuts in politics and in business is because their imagination is *only* limited to the cash register, their vision confined to the tape machine.

A man who wants to know the whyness of the wherefore or the thushness of the this, is in the line of evolution—of advancement.

Anybody can make a statement, but to "show cause" is another proposition.

And the fellow who makes it his business to go around poking "whys?" into everybody's affairs is sure to get some nasty jars and jolts.

He must know how to guard as well as punch—to answer the "whys?" as well as to ask 'em.

There are three ways to attain knowledge: "To ask, to be told, to find out for yourself."

And not one of these processes alone can give you knowledge. They must be used in combination. You must be a seeker, a learner, and a doer.

No man lives to himself alone—we are part of all we have met.

The man who asks gets to know. The man who, when told, takes notice—grows. The man who works, wins.

His imagination, investigation and interrogation give him inspiration—the inspiration born of usefulness.

He stands erect upon his feet, stretching forward to seize every opportunity for advancement.

Our prehistoric ancestors, before the formation of language, used to make known their wants by signs. But with the growth of centuries, language of speech was evolved, and men began to hide their real feelings under a cloak of phrases, and not a few to lie like some sophisticated lawyers.

Then came the printing press, the phonograph, moving pictures, osteopathy, and the player-piano.

All these things are the outcome of the eternal query, "why?"—the result of imagination, interrogation, investigation and work.

They are educators.

And the Trade Paper is probably the most alive to the urgency of education, and the gratification of the mental needs of its readers, than any other press production.

It asks, absorbs, gives.

Look at this paper—note the logic of its discussions, the well-expressed opinions of its contributors, the quality and texture of the paper, the clearness of the type, the beauty of its arrangement. Then tell me if it isn't an education—beautiful, inspiring, strengthening.

Thousands of Trade Paper subscribers are receiving mental uplift and renewing their courage by its means.

The Trade Paper is the leader, the reflector of the Trade World.

It helps you push business, thereby preventing nervous prostration. For nervous prostration is never occasioned by you pushing your

business—it only happens when your business pushes you.

It gives vivid character sketches of the passing great. It takes extensive tours over the fields of science, business and invention. It teaches by living, moving word-pictures the reasons for the failures and the causes of success.

The business of religion is now giving place to the religion of business; and the trade paper is the evangel of the true brotherhood of co-operation and self respect.

Show me the company a man keeps and I will tell you what he is.

Show me a man who subscribes to and reads his Trade Paper faithfully and you show me a man who will "show ME,"—a man alive, alert, ambitious, successful.

He has learned to ask, to seek, and to find. The Trade Paper is his guide, his encyclopedia, his friend.

HE is the WHY of the Trade Paper, and the Trade Paper could not exist otherwise.

The Trade Paper, specialized and classed, supplies him with mental uplift, increases his sum of knowledge, places him in touch with men and things. It is a cathartic, a tonic, and a developer.

And the Trade Paper subscriber in turn provides the gist.

Go to school to the men who know how.

The WHY of the Trade Paper is CO-OPERATION—the greatest force in the world today.

It exemplifies unity of purpose, of endeavor, of achievement. The getting together, holding together and pulling together—the elimination of imperfections and the materializing of ideas and ideals.

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The Meeting of the Kansas Association

Mr. Austin English, Secretary-Treasurer of the Blacksmiths', Horse-shoers' and Wagonmakers' Association of Kansas, reports that the meeting at Salina, November 12-13, was the best in every way that was ever held by the Kansas Association; and that is saying a great deal. The officers elected for the coming year are T. F. Lannan, President; W. C. Johnson, Vice-President; and, of



course, Austin English in the Secretary-Treasurer job. The Executive Board for 1914 will be made up of G. A. Millar; Ed. Bohrer and C. W. Anderson. The Committee on Organization are C. L. Cribbs; Ed. Forney; Perry R. Buckley; J. C. Harris and W. C. Johnson.

The next annual meeting will be held at Wichita and it is expected to do something toward the formation of a National Organization.



A Government-Shop-Built Delivery Wagon

M. A. FOSTER

This wagon was built by the writer in the Government Shop at Fort Logan. The dimensions given and the description may assist other readers who want to build an especially sturdy vehicle that will stand the hard usage to which these government vehicles are subjected.

The Gear

First we will take the gear. Every piece of timber that went into this part of the job was selected hickory.

The axles used were $1\frac{3}{8}$ inch and of the patent type. The rear axle was made straight, while the front axle was considerably arched in order to level up the body when finished.

The reach was $1\frac{3}{4}$ inch square and ironed both top and bottom, as we used only a single reach with two brace irons from each side to the rear axle. Some wagons of this style have wood hounds in rear; we used two iron braces instead. I think this makes a much better job than the wood hounds.

The wheels on this job are the Sarven patent with $1\frac{3}{8}$ -inch tires.

The Body

The body was built 8 feet, 6 inches in length. This is a little longer

than the ordinary body of this type, but the use to which the wagon was to be put required this length. The sills are $1\frac{3}{8}$ by $2\frac{3}{4}$ inches, cut out of selected ash. While the sills are mortised into the rear crosspiece they were lapped on the front cross or endpiece. The crosspiece near the center is bolted onto the bottom of the sills. This makes a better job than to mortise into the sills, as the ends extend out far enough to admit a body brace. The frame of the body consists of five upright posts on each side, cut from selected ash, with two rails lengthwise of white oak to form the panels. The panels were made of $\frac{1}{2}$ -inch poplar with a substantial hardwood rail on top. The front end was paneled the same as the sides. The end was fitted with a drop gate.

The Top

The top was a built-up top, without using any bows. The posts or stanchions are 1 by $1\frac{1}{4}$ inch. This was selected ash and fitted with a rail at the top for the ribs to rest on. The ribs are 1 by 2 inches when finished, and were cut from selected ash. The ribs were first fastened in place on top of the side rails at the top of the stanchions by screws. They

were then secured by being braced with iron.

Strap bolts were made to reach from the bottom sill to the top of stanchion, and were put through the sill the same as any common strap bolt in a farm wagon.

The top panel is fastened to the stanchions, is 8 inches wide and is fastened in place by rivets passing through panel, stanchion and strap bolt.

Poplar top slats, $\frac{3}{8}$ by 2 inches, were used on the ribs to receive the canvas. After the canvas was put on, a clover leaf molding was added all around the edges and also up each stanchion. This formed a panel appearance of the side canvas. Roll-up curtains were placed at each end of driver's seat and are 22 inches wide.

The rear end is provided with two iron doors which are hinged to the rear stanchion and are fastened with a strong lock.

This wagon was used principally for delivering packages of all descriptions from Denver to Port Logan.

The painting of the vehicle consisted of a vermilion red gear, while the body was a dark green, except the panels which were the same as



WAGON BUILT BY MR. M. A. FOSTER IN THE GOVERNMENT SHOP
AT FORT LOGAN



the gear. The wagon was ironed off by Mr. Franz Wenke, a very able smith with whom readers of THE AMERICAN BLACKSMITH are already acquainted.

I don't think it policy to give measurements in all particulars, as

axles upon which he desires information I can explain some of my experiences or method in getting the proper length. Of course, the method for getting the length of any axle is the same, regardless of the width of the track used in different locali-

length between the collars of the axle. In this case, the hub being $\frac{1}{2}$ inch longer than the spindle, the boxing is driven in until it is flush with the face end of the hub, thus leaving $\frac{1}{2}$ inch for the collar to be sunk in at the butt end.

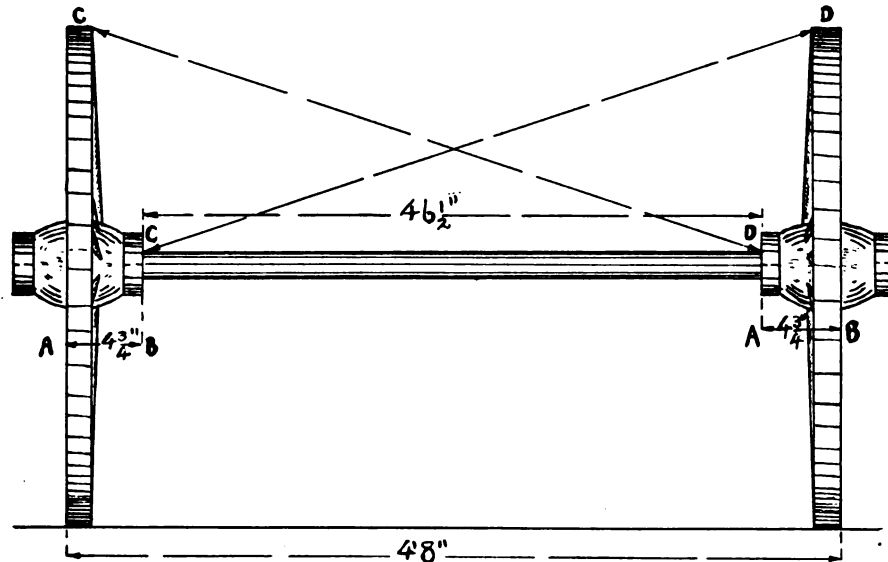
In setting the axle, the spoke of the wheel should be made to stand plumb, that is, the measurement from out-to-out of the rim on the floor will correspond with the width from out-to-out of the spokes at the hub. When both ends of the axle are set under the same amount, and to ascertain this fact, take the measuring rod and measure from the collars to the top of the rims as shown in engraving from C to D. If these are alike, the two spindles are set under the same amount, provided, of course, the wheels have the same amount of dish. The axle should have a little forward gather, also, of about $\frac{1}{2}$ inch narrower in front, on account of the taper of the spindle. The most accurate way as well as the quickest for setting an axle is to use an automatic axle gauge which can be secured for the small sum of \$5.00, but will repay its cost in a short time if you have any amount of axle work to do.

If there is any further information desired or if my explanation is not entirely clear or not exactly to the point I shall be very glad to give any further information on the subject that may be desired.

From Discounting Notes to Discounting Bills

When Joe Bigelow, proprietor of the Bigelow Shop, walked into the Chandler County National Bank he felt like a dark-gloomy day which threatened rain; and when he walked out he felt like a rainy Sunday after a two-weeks steady downpour; for while he had gone to the bank for help, for salve to ease his troubled brain, he met with the reverse, which merely multiplied his troubles and increased his worry.

Joe Bigelow had started in Chandlerville some four or five years ago. He was a good mechanic, had a bit of money and he equipped a good shop. In the enthusiasm of owning his own business, Joe pushed things with all his ability and for two or three years prospects seemed to be especially bright and promising. After



MR. PETERSON EXPLAINS HOW TO MEASURE AXLES

this is a heavier wagon than is generally used in civil life. I have built and repaired wagons for the government for the last ten years, and I find that I have to make every job much heavier and stronger than a job that is used in civil life, on account of the hard usage to which it is put. I have seen the ordinary delivery wagon turn over and the top crush to pieces, but a top built like this one can be upset without much danger of being broken. I presume that most wagon builders in civil life think that Government Shops are fully equipped with all modern machinery, tools and supplies of all kinds to work with. This is decidedly a mistake. When we build a job as mentioned we have to make it up out of just what happens to be on hand, and invariably we have to substitute all the way through the job.

The Length of Front and Hind Axles

NELS PETERSON

In the November issue, Brother W. E. Riffe inquires the proper length of front and hind axles, but does not state whether he means wood or steel axles. If it is steel

ties. There are three different widths; narrow, standard and wide track, and they measure as follows:

Narrow track, 4 feet 4 inches
Standard track, 4 feet 8 inches
Wide track, 5 feet

In some cases the length of the axle depends on the width of the body, regardless of the track. Where the body is unusually wide the axle must be long enough to allow the body to hang between the wheels without striking. In either case the measurement is from out-to-out of the rim on the floor.

To get the length of an axle for a 4-foot 8-inch track, and which is the most commonly used, it is obvious that the length of the hub must be taken into consideration. For instance, a pair of wheels with 6-inch hubs must, of necessity, require a longer axle than wheels with 12-inch hubs. A $1\frac{1}{4}$ -inch axle usually has a 7-inch or $7\frac{1}{2}$ -inch spindle. Taking this as a basis we start by measuring the hub from the face of the spoke to the butt end of the hub which we find to be $4\frac{3}{4}$ inches, as shown in accompanying engraving at A and B, and twice $4\frac{3}{4}$ inches equals $9\frac{1}{2}$ inches. Therefore the width of the track required is 56 inches, and 56 inches less $9\frac{1}{2}$ inches leaves $46\frac{1}{2}$ inches which is the proper



a time, however, he considered his business pretty well started toward success and also that his time for taking things a bit easier had arrived. Accordingly he left matters pretty much to his help until he got down into the rut which eventually claims most men who are flushed by apparent success. This attitude toward his shop and business soon placed Bigelow where he must have aid from the bank. He accordingly succeeded in placing a note with the Chandler County National who gladly extended the accommodation on what they considered a live and growing business. But when Joe Bigelow came with a second note which he desired to discount the bank instead of appearing in the guise of a friend and helper, looked like a marble statue clad in gauze on a winter's morning with the mercury at twenty below. For before Bigelow left the cashier's window he was advised that not only did the bank refuse to discount the new note but the other one must be paid just as soon as due. "We cannot renew it, Mr. Bigelow," said the cashier. "Our committee had your account up for attention at the last meeting and on considering the latest report you made to the bank they do not feel that they can renew your note."

Failure—was written on Joe Bigelow's face after his talk with the cashier. His heart and head felt as though being gripped in a vise while the handle was being slowly but surely turned and the jaws slowly closing in. Never before had he considered himself a failure. But now, with five men hard at work in a well-equipped shop, he must brand himself as a failure, not merely unsuccessful, for had he not been mounting the upgrade since he opened in Chandlerville—had he not a goodly force of good men and machines working for him? Yet he had failed—failed shamefully—failed in the very face of success—failed at the very threshold of his goal. Why?

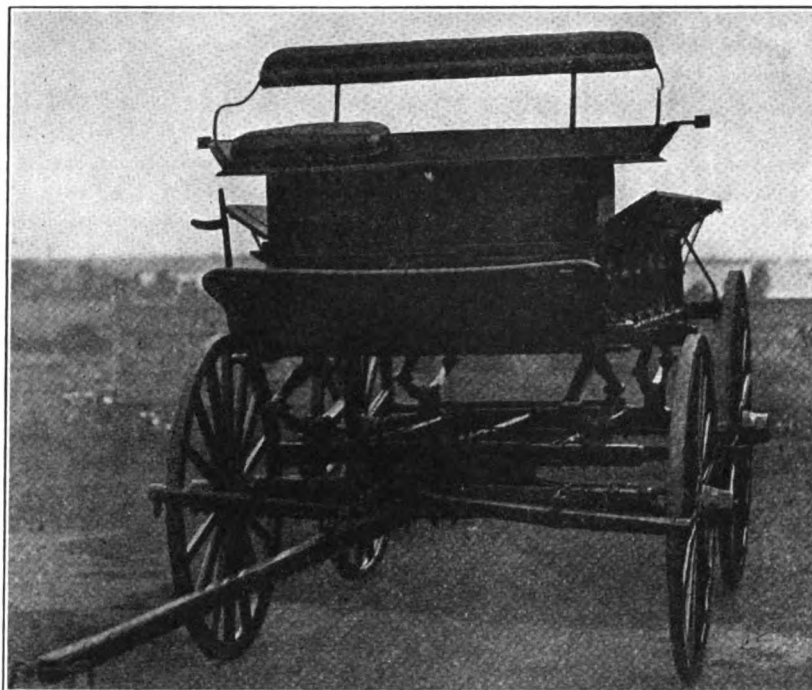
These were his thoughts as he plodded slowly shop-ward from the bank. These were his questions as he attempted to solve the problem. As he entered the shop the very whirl of the machines seemed to mock him—the pound of the power-hammer seemed a laugh at his disgrace and humiliation.

Mechanically he turned to the safe, took his business books from its depths and sat at his desk to figure a way out of his difficulties. He must get cash immediately to meet his bills and to meet the note

sentence set inside a square of fanciful characters.

"Live for your business, and make your business live," read Bigelow.

The sentence seemed to hold some magic. He read and re-read



AN AUSTRALIAN WAGON. NOTE THE GENERAL CONSTRUCTION, THE UNDER GEAR AND THE HEAVY BUILD

held by the bank. He glanced over account after account in a search for possible collections. But those customers owing him any considerable amounts had already explained why they could not pay, while those who could have paid had little or nothing charged to their accounts. An examination of his bank book showed that little comfort was to be gained in that direction. His total cash on hand, in bank and in accounts that could be reasonably considered sure, would barely meet one tenth of his total indebtedness, including the note. Prospects were indeed black.

Joe Bigelow got little sleep that night. His bed seemed a large flaming note, while the covers appeared as an ever-growing pile of bills that threatened to smother him whenever he closed his heavy lids.

* * * *

After he had opened his shop the next morning he sat down to read the paper, as usual, but could not seem to get interested in it. His eyes roamed from page to page when at last his glance fell upon a little

it—then he cut out the little fanciful border with its message and pinned it up over his desk.

"I wonder if that's true?" asked Bigelow. "If it is, I haven't been working right—I haven't even scratched the outer shell of that truth, if it is truth. And to find out if that is true I'm going to live for my business and push it so hard toward success that there'll be no coming back."

And suiting his words to actions he started right in. First he collected all the money he could possibly scrape together. Then he called on all good credit customers, and not only secured business that was going elsewhere but riveted attention to his shop in such a way as to keep business coming his way. When the newly secured work was going through the shop he gave it his personal attention, hustled it out and then hustled out, himself, after the money. By these aggressive methods he soon added a goodly sum to his bank account; and as a consequence he promptly took advantage of several liberal discounts on some of his



recent bills. This had the effect of restoring the confidence of these jobbers and manufacturers, and also in again establishing his good relations at the bank.

It was with a trembling hand that Joe Bigelow opened a letter from the bank one morning, for while he had been working hard to re-establish his business he had no reason to believe that the bank would do otherwise than insist upon the payment of his note. He was surprised, therefore, to read that the bank was willing to renew the note if that would be of help to him in the re-organization of his business and credit. And in thanking the president of the bank a few days later the banker said, tersely: "It's simply business, Mr. Bigelow. We find that a man who pushes his business seldom has to be pushed for money. Just as long as you keep pushing we'll not push you."



The Machine and Tool Smith

Making a Long Lead Screw for a Lathe

JAMES CRAN

There is nothing out of the ordinary in the making of a forging for a lead screw unless the lathe into which the screw is to fit happens to be out of the ordinary. Recently, the company by which the writer is employed had to build a 60-inch lathe that would measure at least 70 feet between centers. This meant that the bed of the machine had to be 80 feet, 6 inches long to accommodate the head and the tail stock and still leave the specified 70 feet between centers. As the lead screw of a machine of this kind projects beyond both ends of the bed, the forging for the screw had to finish

82 feet, 6 inches over all. To add to the difficulty of making a forging of this length the forge shop measured only 50 feet inside the walls. There were no lifting or handling facilities other than the men employed in the forge shop and a gang of laborers. Then, too, the longest lathe available for turning and cutting the thread on the screw measured but 35 feet, 6 inches between the centers. This meant that the whole of the work had to be done in sections.

The material for the forging was machine steel, .35 carbon, 3 inches in diameter, and was supplied to the forge shop in lengths of about 15 feet, making five welds necessary. The first section, upon which the collar was welded, was made up of two lengths of stock; making it approximately 30 feet in length. This was turned and had the thread cut to within about 3 feet of the end. It was then returned to the forge shop and another section of two more lengths of stock was welded on. To do this, one end of the screw had to be run outside through a hole in the end of the forge shop where it was lifted and handled by a gang of laborers while the forge-shop force took care of the lifting and handling, as well as the welding, inside. When it was returned to the machine shop the tail stock was removed from the lathe used to machine it, and the rough end of the forging was clamped firmly to the center in the head by means of a yoke and two bolts through the face plate. The finished end which overhung the end of the lathe bed was supported and kept in alignment by adjustable horses having wooden V-blocks for it to turn in. The third section was welded on and machined in exactly the same manner, the only difference being that

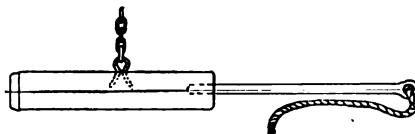


FIG. 1—THE RAM IS SUSPENDED FROM THE CEILING

more men were required to handle it.

In making lead screws and similar forgings without special facilities for the work a forge is placed in as close proximity to the steam hammer as possible. This is done to save handling and carrying. The first operation in forging a lead screw is

to weld on the collar which on the larger screws is usually from 3 to 4 inches from the end. Welding on a collar is too ordinary an operation

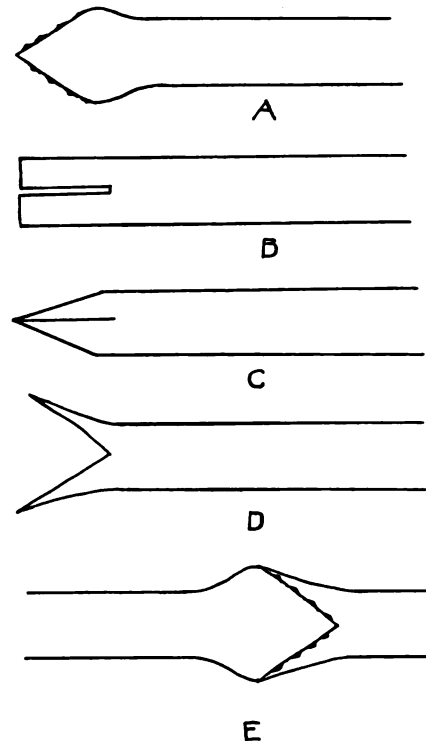


FIG. 2—BOTH ENDS ARE UPSET AND PREPARED FOR WELDING

to need any explanation and is in a great many cases all the forging that is necessary when the length of the machine it is intended for does not exceed 18 feet. When they are longer than that and have to be made up of two or more lengths of stock they are generally put together by what is known as the V or split weld. About 6 or 8 inches of the end of the bar, according to its diameter, is heated and upset by means of a ram of the type shown in Fig. 1. This is suspended from the roof timbers by a chain and swung horizontally by means of the rope. The bar while being upset rests on and projects over the lower die of the steam hammer, the other end being supported in a hook. Ramming or upsetting is continued until the diameter of the heated portion of the bar has been increased by about one quarter of its original size. The number of men required to do the upsetting varies according to the size of the work. Bars from $2\frac{1}{4}$ to $2\frac{3}{4}$ inches in diameter can be upset by seven men; four to swing the ram and three to hold the bar up against the blows. When the diameter exceeds that, a heavier

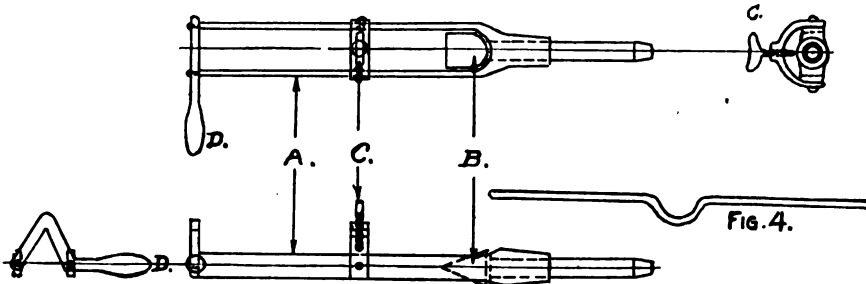


ram and more men are required.

In V or split welding the male scarf is made first and has a few sharp burs raised on the sides with a chisel, as shown at A, Fig. 2. It

is lifted and carried to the steam hammer with bars shaped as shown in Fig. 4. Usually on work of this kind each man is expected to handle about 100 lbs., so it will be seen that

absolutely correct. In a locomotive or manufacturing shop conditions are different, as the smith works from drawings and in many cases has no means of measuring the circumference the ring is to fit over. Oftentimes the ring has to be finished on all sides in the machine shop, and the proper allowance has to be made for finishing. Many smiths have different methods of calculating the straight length of the bar. Many use the old rule, as 7 is to 22 so is the diameter to the circumference. Others take simply 3 times the diameter plus one-seventh of the diameter. Then again, others use the simple method of 3 times the inside diameter plus 3 widths of the iron. The writer's method is to use the formula, 3.1416, multiplied by the diameter of the ring at the neutral axis of the bar. The above methods are practically correct, measuring from the center of the metal, but do not give the short and long side of the straight bar, as shown at Fig. 1 A, 2 B, and 3 C. I, as well as others, have searched mathematical and mechanical books for formulas that would give the different functions of a ring that has been bent from a heated bar of iron of given dimensions. I could not find anything bearing on the subject; consequently, Mr. Harkins, my assistant foreman, (who is an expert mathematician) and the writer undertook to solve the problems, and have fully demonstrated and proved by experiments in



FIGS. 3 AND 4—SHOWING SPLITTING DEVICE AND A CARRYING HANDLE

is then allowed to cool while the bar that is to be welded to it is being prepared. This bar is upset and then split with a hack, as shown at B. The points are then drawn down, as shown at C. They are then opened out, as at D. The tool for opening the split is shown in Fig. 3 of which the following is a description; A is the frame, B a wedge-shaped plunger which slides in the socket at the end of the frame and opens out the ends of the scarf. This plunger is struck on the end with the ram. A thumbscrew at C allows for adjustment to suit different diameters of stock. The handle at D enables one to hold the tool in position while it is being used. Bars from $2\frac{1}{4}$ to $2\frac{3}{4}$ inches in diameter are usually upset, split, scarfed, opened and closed in on the male scarf at one heat. It is important in split welding that the male scarf be cold or practically cold before the female scarf is closed in on it, so that the sharp burs on the sides of the male scarf will imbed themselves in the hot metal of the female scarf and hold them firmly together, as shown at E, Fig. 2. The heating and welding is done in a fire with two firmly packed sides rising at least 6 inches above the level of the top of the forge. The pieces to be welded are placed between the sides, and the top is covered with a large firebrick (which is banded to keep it from breaking and is also provided with chains by which it can be lifted off). The ends of the fire are banked up with green coal to within about $1\frac{1}{2}$ inch of the brick, and the fire is fed with well charred coke, left over from previous fires. When the work is ready to be taken from the fire it

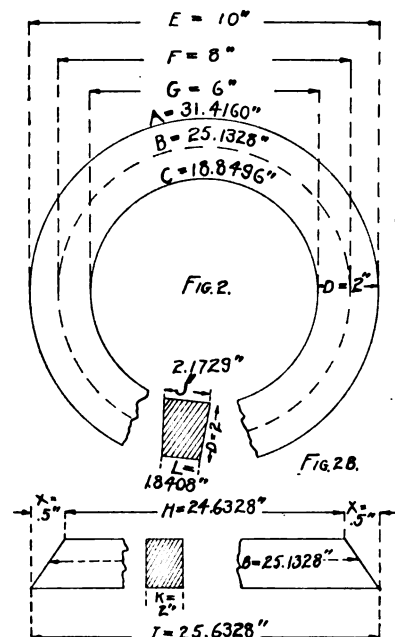
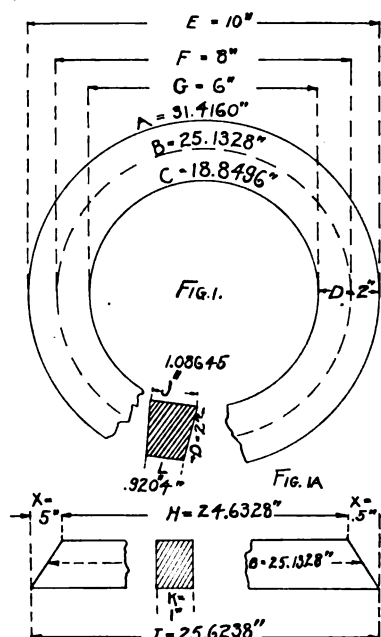
20 men were required to lift the long lead screw here described, as its weight was approximately 2,000 lbs.

A Formula for Accurately Calculating Stock for Rings and Bands*

S. UREN

Many different methods are produced by practical smiths to determine the proper length to cut the straight bar. The carriage smith will either roll the wheel over a long bar of iron or will use a tire wheel and roll the outside of the wheel and the inside of the tire, making the allowance for the openings between the felloes, which method is

*This formula was produced by Mr. Uren several years ago and published in these columns at the time. Its republication now is in response to a number of recent requests for information on stock calculations for rings.



HOW THE FORMULA WORKS ON RECTANGULAR AND ON SQUARE STOCK

011741

actual practice of the formula. Fig. 1 represents a ring bent from a bar of iron 2 inches wide by 1 inch thick. The usual custom of the practical blacksmith is to cut the bar to the length produced by the formula 3.1416 multiplied by the diameter of the ring and guessing at the angle to cut the end of the bar. Oftentimes, after the ring is bent, the inside would meet, leaving an opening on the outside, and if cut in excess, similar conditions on the inside. In nearly all cases the smith will cut his iron long, and trim to the proper shape after being bent. The formula of Fig. 1 A is simple and will give the angle. The end of the bar should be cut before bending. The difference of the long and short diameter divided by the sum of the long and short diameter, multiplied by the width of the iron, will give the required angle. The result in all cases should be added to the length produced by the above formula and the angle cut as shown at Fig. 1 A. If the ring is not to be welded, the ends will come together, forming a perfect joint.

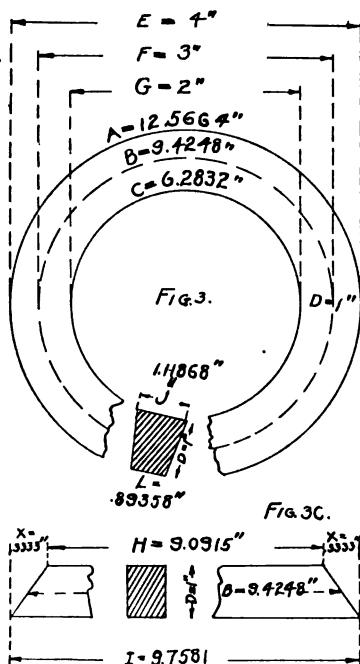
It will be observed from Fig. 1 and Fig. 1 A, that the metal changes

reverse conditions exist in the outside of the ring. The actual length of the straight bar is 5.7832 inches shorter than the actual outside circumference of the ring; consequently, the surplus metal has to be accounted for on the inside of the ring and diminished on the outside. The extra metal increases the thickness of the inside of the ring, as shown at section J, and decreases the thickness, as shown at L.

Oftentimes the smith has to make rings in sections, as shown at Fig. 4. The same formula will apply to produce the angle projections in the straight bar. The usual custom of the smith is to guess at the angle when forging the projections in the straight bar and set the ends properly after the section of ring is bent. The formulae are correct, if the rings are bent at an even temperature and the metal has the same tensile and compression strength. Practically, the metal has about equal tensile and compression strength at a bright red heat. When making rings from uneven shaped iron, such as T shapes or channels, the formula 3.1416 multiplied by the diameter must be

formula corresponds to the dimensions of similar rings produced in actual practice. Very few smiths realize that the length of the short side of the straight bar in a 6-inch ring, 2 inches wide, is 5.7832 inches longer than the inside circumference of the ring, and the long side as much shorter than the outside circumference.

The formula to produce J is all that is required, as what J is more than K, L is less than K. This formula for calculating stock for rings applies to diameters between one inch and ten feet.

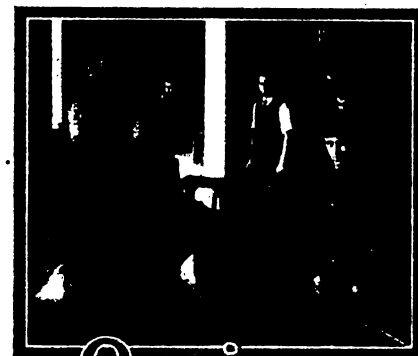
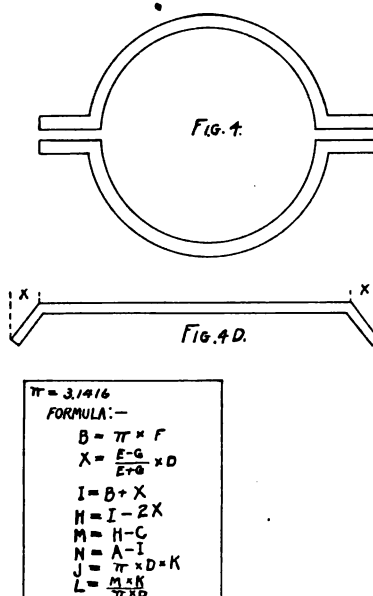


THE FORMULA IS ALSO ADAPTED FOR THE CALCULATION OF RINGS MADE IN SECTIONS

its shape in bending. The inside circumference of Fig. 1 is 18.18496 inches. The length as shown in Fig. 1 A, to produce the circumference, is 24.6328 inches, or 5.7832 inches in excess of the inside circumference of the finished ring. The

figured from the neutral axis of the bar.

In Fig. 1, a 6-inch inside diameter is produced from a 1 by 2-inch bar. In Fig. 2 the same inside diameter is produced from a 2-inch square bar. The figure produced by the



Queries— Answers— Notes

Welding and Tempering Auto Springs.—

I would like to hear from some brother who is familiar with welding automobile springs, especially the tempering after welding. I weld them, but do not understand tempering and would like to hear from someone who is doing this kind of work successfully. H. C. HEITHECKER, Indiana.

In Reply.—The March issue, page 136, contains information on this subject.

Calculating Stock for Rings.—Brother Browning asks in the November number how much stock will be required to make a 5½-inch circle, bent edgewise, out of ½ by 1¾-inch stock. A. L. M. replies "22⅞ inches," which is a mistake. It will require 24 inches, which includes 1 inch for welding lap. It should be remembered that a piece of iron bent edgewise stretches on the outer edge more than it takes up on the inner. So we have very little contraction to contend with.

W. H. GUNN, Virginia.

That Scientific Horseshoer.—In the November number, Brother John Denbo seems to think that it was I who claimed to be a "Scientific Horseshoer," and if he had that impression he is mistaken. I quite agree with him in his remarks regarding the "Scientific Horseshoer," but do not want him to imagine that I pretend to title myself as one, by any means.

I turn out the best work that I know how and let my customers do the talking if it deserves any praise; therefore, I believe I have my colors down with the rest of the brothers.

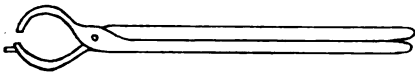
The person to whom I had reference is a new man here and seems to think he "knows it all." He has cut prices so low that we cannot begin to compete with him



in this line. Of course, his work is just as low as his prices; nevertheless, it hurts the other smiths here. There are only four shops here, and there is more or less price-cutting carried on right along.

A GEORGIA SMITH.

An Auto Tire Remover.—I will endeavor to explain how to make an auto tire remover, that is if it is a clincher tire and



AN AUTO TIRE REMOVER

hard to remove from the groove. This tool is made of $1\frac{1}{2}$ by $\frac{1}{2}$ inch iron or steel, and requires two pieces $12\frac{1}{2}$ inches in length. Punch holes about 6 inches from the end in each piece, place in vise and twist half around. Then make the jaws, and rivet the tip on $\frac{1}{2}$ inch from the point of the jaws and 1 inch long. Place over tire, press on handles and your tire can be easily removed. Make handles $2\frac{1}{2}$ feet from rivet hole. See engraving.

J. DENBO, Maryland.

Axle Setting.—In the November issue W. E. Riffe asks advice about setting axles and their length. When wheels are nearly the same height (as buggy wheels are) make front axle $\frac{1}{8}$ inch longer than the rear. If there is a difference of 6 or 8 inches in the height of wheels, make front axle $\frac{1}{4}$ inch longer; this will square the difference in height.

Second:—Set axles so that wheels will bear evenly on the bottom, which means a plumb spoke. The engraving represents buggy wheels with $\frac{1}{4}$ inch dish and tires 1 inch wide. Distance between tires is $2\frac{1}{2}$ inches wider at top. Therefore, the rule is: All wheels should set at right angles at the bottom, which will bring face of tire to a square, plumb bearing.

W. H. GUNN, Virginia.

How to Melt Brass.—I would like to know how to melt brass or copper in a small crucible? I would also like to know how I could run new boxing in small machinery such as binders, etc., out of brass. I would like to use brass instead of babbitt sometimes.

FRED H. PETTIT, Oklahoma.

In Reply.—Brass melted in an open crucible oxidizes rapidly on the surface and must be carefully skimmed with a small rod or stick before pouring. Finely powdered charcoal sprinkled on the surface alleviates this oxidation. The fire used in melting should be deep and the blast moderate, and at no time should the crucible be subjected to a sudden fierce blast of heat or air. If the crucible is of good size it is well to build up around it with fire brick banked with coal and cinders to confine the heat. The temperature should be between 400° and 500° . The method in using brass for boxing is practically the same as in using babbitt.

E. V. S., New York.

A Connecting Rod for Mowing Machines.—Although I have never been called upon to repair mowers I have frequently made barrel eyes for various jobs, and perhaps my way of doing the work may be of help to Brother Gretton who asked how to forge a connecting rod for a mowing machine.

Take a piece of 3 by $\frac{3}{8}$ -inch (soft steel is preferable) and cut out as shown at A, then split and feather the ends slightly as at B, B. Now heat and turn around and shape up eye roughly with the aid of a

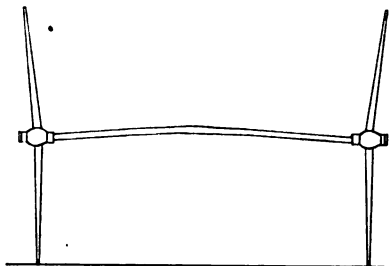
$\frac{5}{8}$ drift, and see that the scarfs which the splits form are in good shape for welding as shown at C. Now place in the fire and raise a good heat, insert the drift again and weld up with short swedges and quick blows. I make barrel eyes of various sizes in this way, and very little practice gives a good looking job. After punching the barrel, weld shank to length required; the only fault with this plan is a slight hollow in the center of the inside of barrel, but if properly done this will be very slight. Keep drift straight and smooth.

NEW READER, Australia.

The Reason for the Toe Clip.—In reply to Mr. Ernest Finley, regarding a toe clip on shoes and why it is used and the benefit derived from its use, I will explain my understanding of the matter.

Horses traveling on country roads and those working on plowed land or soft roads generally have sound and healthy feet, and for such feet clips are not necessary, because the foot is strong enough to hold the shoe on for the required length of time, which is about four or five weeks.

In hard, hilly sections and paved streets where there is no moisture in the ground the feet become very dry and the more or less contracted wall becomes brittle and broken. In cases of this kind clips are very necessary, and should be carefully and properly fitted so as to prevent cutting through the wall of the toe. The clip should fit against the laminae and be pushed up so



MR. GUNN TELLS ABOUT AXLE SETTING

that it will fit over outside of wall in the case of either a side clip or toe clip. The clip holds the shoe firmly and relieves the strain on the walls where nails are driven to hold the shoe on.

I am pleased to note the interest Mr. Dunston of Michigan has taken in my previous article.

ALBERT MEIER, Pennsylvania.

Tempering Cold Chisels and Bits.—Would like information in regard to tempering cold chisels and bits for drilling. I am repairing these in a railroad shop and should like to know exactly what temper to give them, as the men are expected to drill $\frac{7}{8}$ -inch and 1-inch holes through $\frac{3}{4}$ -inch steel rail in three minutes with a ratchet. I use soft water but do not get the desired results. I will appreciate any and all information you can give me on tempering and repairing the tools I have described, especially the bits.

THOMAS BONNETT, England.

In Reply.—Heat the chisel to an even dark red, back as far as it has been drawn. Plunge it in the bath (water) straight down as far as you have it hot enough to harden; move it up and down a little, but not sideways. As soon as the chisel is cooled through take it out and rub one side bright (of course there is only enough heat left in this chisel to start the temper a little; that is all that is necessary); now hold it over the

fire and draw it evenly all over alike to a regular cold-chisel blue.

A bit is hardened the full length of the twist, polished bright and the temper drawn to a purple by moving back and forth over the fire.

E. V. S., New York.

On Tempering Gun Springs.—Springs are generally made of a steel lower in carbon than ordinary tool steel, and as low carbon steel requires a higher heat to harden it is necessary to experiment in order to ascertain the proper temperature to produce the best results. The amount of heat given should be gauged by a thermometer. It ranges from 560° to 630° .

The following method is a very reliable way of tempering all kinds of gun springs: The spring is placed in a perforated pail which in turn is set into a kettle of oil or tallow. The cover should be high enough to take in the thermometer and should be provided with a long handle to facilitate putting it on in case the oil "flashes." Keep the thermometer away from air currents—in fact, the whole thing should not have any irregular air currents playing on it.

If the spring does not harden in sperm oil or tallow, use the following:

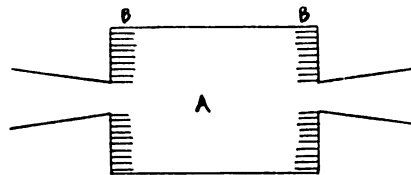
Spermaceti oil.....	48 parts
Neatsfoot oil.....	46 "
Rendered beef suet.....	5 "
Resin.....	1 part

Resin in the hardening bath has a tendency to crystallize the steel. Dipping the steel before heating into a dish of soft soap or some potash dissolved in water has the effect of preventing oxidation and helps to strike the scale.

E. V. S., New York.

Vicious Horses—Toe Clips.—I would like some information on how to manage wild, disobedient horses while shoeing them. Would it be dangerous to put them under the influence of chloroform? If so, what can be done to conquer them. It seems to incense them to be severe with them, so I would like a safe plan to follow, and any advice on the matter will be greatly appreciated.

One of the brothers wanted to know what benefit was derived from the toe clips on the shoes. I do not consider that they are of any benefit whatever except in cases of horses that slide their feet along. In cases of this kind, of course, they prevent the shoe from sliding back under the foot. The clips are a disadvantage when they are not required, because where they fit into the toe a dry decay is very likely to occur because of rasping the toe to fit the clips. Therefore, my advice is not to rasp the



A CONNECTING ROD JOB BY AN AUSTRALIAN



foot more than is necessary. Shoeing with wide calks is a good plan to follow.

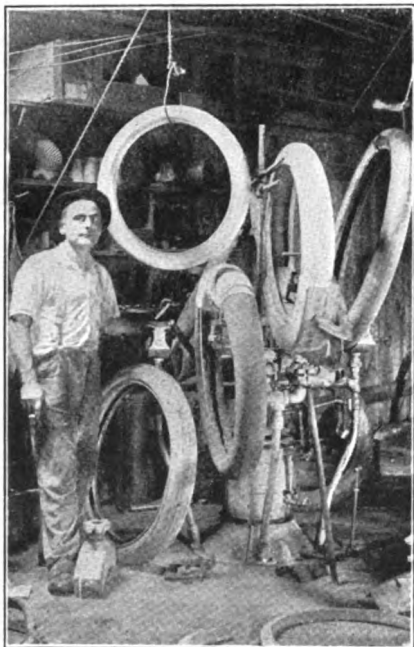
JAMES BOND, Kentucky.

In Reply.—A vicious horse can usually be subdued by the use of special ties. This issue contains an article on special ties and rope holds for animals, and will no doubt be found of practical value to many horse-shoers. We have heard of some smiths who used chloroform, but we do not recommend this practice. J. F. M., New York.

Credit and How to Establish It.—In your July issue you published an article on "Establishing Credit When You Least Need It," and therein give circulation to what strikes me as a mistaken view on good business.

Countries may differ, and as I have not yet been in yours I will content myself by saying that in this country that article is wrong. It is the man who asks for no accommodation who makes the best buying and secures the best treatment from the merchant. It was recorded at the recent National Convention of Carriage Builders of New Zealand that to go to your merchant with ready money with which to buy was more profitable even than to indent from abroad. That it should prejudice a man when he asks for credit, to know that he has for years paid cash, is not sound reasoning, and here it is contradicted in experience. Quality, of course, will tell in buying, but that apart, cash will buy more than credit and will establish a better repute.

Let me say, too, that to hold up cash when you have it and can pay is very bad



THE CORRELL SHOP OF OHIO GO
AFTER AUTO TIRE WORK—
AND GET IT

practice. We don't like to wait for our money and we should encourage the quick circulation of coin. Were I starting in business over again, my first endeavor would be to always pay cash, even though I borrowed to do so.

GEORGE DASH, New Zealand.

Note.—The article to which Mr. Dash refers was published as an Editor-Benton discussion under "Around Our Forge Fire." The paragraphs in which the Editor expressed the views with which Mr. Dash disagrees so radically are reprinted together with the Editor's reply to Mr. Dash's letter.

It is the desire of both Mr. Dash and the Editor that this subject be discussed thoroughly by other readers. Express your own views on this matter, for as Mr. Dash says, "Unless one states one's views there will never be any progress toward the light we all seek."

These are paragraphs from the article:

"Suppose you are in business, you buy your goods from manufacturers and jobbers; and doing a good business you make a point of discounting your bills regularly and promptly and are considered an ideal customer by all from whom you buy. Now, let us suppose some big deal comes along for which you need ready money and in which deal your money will be worth more than in discounting your bills. Just so sure as night follows day will your manufacturers and jobbers start a-gossiping and remarking about your strange, unexplainable failure to discount your bills; and the very fact that you were so ideal in this respect will be the means of destroying your credit. While you, on the other hand, were beginning to think that because you were paying promptly each and every month you could get just about anything and everything you wanted from any house. Again I say, the time to establish credit is when you do not want it—then you'll have it when you need it."

"In the first place," began the Editor, "credit is worth something; so if it is going to cost anything to establish credit we shouldn't hesitate about paying a reasonable cost. Now, let us suppose we are in business. We are able regularly to pay and to discount our bills, but we don't. Every once in a while we take full time and sometimes a little over. Of course we pay in the end and we lose the discount, but we are establishing credit. Then one day we both hustle over to our bank to have a note discounted—we don't need the money, but we do need the credit, so we can afford to become offended if the bank refuses and we can afford to take our account down the street to the other bank. Of course the interest on the note is something, but so is the credit that we are trying to establish. And anything that is worth anything is worth paying for. So we pay our note promptly when due and charge the interest to the cost of establishing credit. It simply works out the same as in the little loans made in personal affairs of men. You meet Jones on the street or at lodge and he borrows a five-spot. The next morning you receive his check by mail. And the next time he wants to borrow do you refuse him? Do you think any less of him because he borrowed that five and paid it promptly? So, I say, if you don't need credit, so much the better and so much easier to establish it so you will get it when you do need it."

This is from the Editor's letter in reply to Mr. Dash's letter: "I would a thousand times rather have you place your views before me than to disagree with me so radically and say nothing whatever."

"With reference to criticism. If you will re-read paragraph three in my discussion you will find that the case cited is an absolute fact. And I do not believe that changing the scene from the United States to New Zealand soil will alter the facts much."

"That discussion on credit was not written on the spur of the moment nor without considerable thought being devoted to the subject."

I think perhaps in considering this matter that if we will regard it as bearing right upon our own business, if we will put ourselves in the place of the man who extends the credit, we will see the matter correctly. Suppose, for example, that we have a customer who has always paid promptly immediately upon receiving our bill; but one month comes when we do not hear from him immediately. We send our bill as usual, but no check materializes. We are suddenly brought to realize on the 10th, when going over our accounts, that "So-and-so" has not yet paid. "He always pays on the 2nd or 3rd at the latest," we tell our wife, "cannot understand." Still we wait and still no check on the 14th. Finally, we see the grocer and ask him confidentially about "So-and-so." He reports that he also is puzzled, and the butcher and the drygoods man tell the same story. "He always paid promptly. I wonder what's the matter." And so, finally, the thing may work out so as to destroy the man's credit instead of strengthening it.

THE EDITOR.



The Automobile Repairman

When water is left in the engine in an unwarmed place, trouble, of course, is expected, and if the frost be at all severe, trouble there will undoubtedly be; but it is rather galling after the water has been drained out of the radiator and engine to find that when the thaw comes the cylinder jacket is cracked after all. Mud and sediment are apt to collect around the bottom of the water jackets, and as the water drains out of the jackets this sediment is very apt to stop the cock before all the water has been run off. The only safe way is to watch the water running out of the jackets, and directly it stops flowing the tap should be probed with a piece of wire. Nearly always more water will begin to flow, and directly it stops the tap should be probed again and again till no more water issues from it.

If gasoline drips from the carburetor when the car is standing with the engine stopped, the needle valve connected with the float should be investigated. If pressing down stops the dripping, the float is too high. If the dripping persists, the valve leaks and should be ground to a fit, preferably using pumice stone.

In draining a radiator in a car in which the radiator drain cock is so placed that the water from it strikes the axle and spatters over things generally, it is a good plan to place the edge of a funnel against the valve and thus direct the flow of water away from the parts of the car into a pail.

Care of oil lamps. While it is common knowledge that acetylene lamps must be kept clean, it is often imagined that an oil lamp ought to go indefinitely without an internal clearing. One of the commonest reasons for oil lamps going out is the choking of the draught holes in the cap of the lamp by deposits of carbon. These should be looked for and removed before any lengthy drive at night. The other essentials are a good lamp, good oil and a clean, dry wick.

The introduction of a little flake graphite into the lubricating oil, in the proportion of about a teaspoonful to a pint of oil, builds up even the most microscopic irregularities on bearing and wearing surfaces of pistons and cylinders; resulting in better lubrication of the cylinders, better compression and great economy in oil.

To repair punctures in tubes, first see if the puncture is in one wall of tube, only, or if both walls are perforated. Be sure that the article causing the puncture has not lodged inside the tube. Lay the tube on a convenient flat surface and then with emery paper clean around the puncture a space slightly larger than the patch to be used. Select a patch about an inch and a



half larger than the injury in tube and clean it carefully on flat or unbeveled side with emery paper. Coat cleaned surfaces of both tube and patch with cement, letting same dry thoroughly. Then apply a second coat. After about ten minutes, when surfaces are dry but still "tacky," press patch firmly in place, excluding all air bubbles with the fingers, taking care that edges of patch do not curl. Now tap patch lightly all over its surface with some round, smooth object like the end of a tool handle. This, if done carefully, will exclude every particle of air and the cemented surfaces will adhere perfectly.

When a nut has been lost, and no duplicate is at hand, as good a plan as any is to wind the threads of the bolt tightly with soft iron wire, such as stovepipe wire, or with soft copper wire, a coil of which should be on hand in every repair shop, as it has many uses. The winding should start at the end of the bolt and follow the threads up to the part that it is desired to retain. The wire is then wound back in a second layer over the first and the ends twisted together. A metal washer nearly the size of the bolt if available will prove of value to place next to the part to be retained before starting to wind the wire. If there is a hole in the bolt for a cotter pin or split pin, one should be inserted and the ends of the wire twisted around it, so that the improvised nut cannot screw itself from the bolt. If the split pin hole is of large enough size the distance between it and the part to be retained may be filled up with washers of metal or wood and a large nail driven into the hole will act as an effective support for the parts. Then, again, when used for light work, a washer of wood or leather may be screwed on the bolt. If the nut is in an important part of the mechanism take one of suitable size from some other portion of the car which is not of real importance.

If a carburetor catches fire through a backfire, the fire may occasionally be extinguished by turning off the gasoline and racing the engine. The engine will soon suck it out, and there is very little danger.

Spare asbestos washers should always be treated before being placed among the spares on the car. A six hours' soaking in olive oil followed by a draining and brief drying and a final rubbing in of fine black lead will give a good tight washer that will come adrift cleanly at any time.

Too great care cannot be exercised in keeping the mudshield below the engine and gear-box clear and free from volatile oils. Despite supposedly adequate provision for drainage, the average undershield usually contains a small-sized pool of mingled grease, water and oil which is as tinder to a possible spoonful or two of gasoline, such as may trickle down from the carburetor at almost any time.

Where rubber hose is used to make connections in the water circulation pipes of a gasoline motor, and has bends in it, a good plan is to reinforce it by a brass coil spring which is a good fit inside. This prevents any flattening at the bend, and cracking, resulting eventually in a leak.

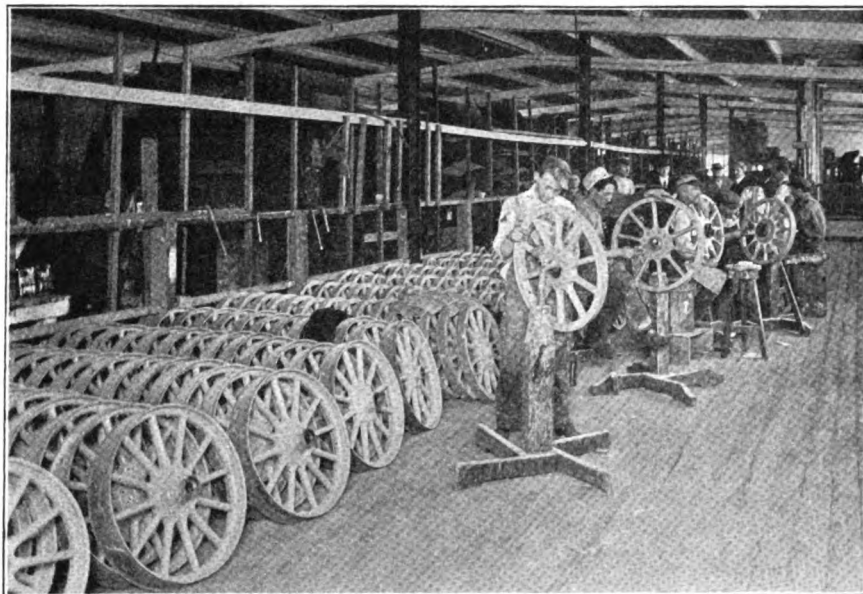
How to Wash the Automobile

It requires skill to wash an auto quickly and effectively. For a dry, mud-covered car, the body should first be soaked—do not squirt the water on, as the force of the liquid against the mud particles will scratch

the varnish. The water should be flowed on, and if tepid—not hot—all the better. Forced water may be applied to the wheels, underneath

being washed, others will not—don't try it on the latter.

If no running water is available, it should be soaked in by a sponge;



IN THE WHEEL-PAINTING SHOP OF A LARGE AUTOMOBILE FACTORY

the fenders and on the running gear. After having thoroughly soaked the machine—say about twice—it should then be sponged. A good quality sponge should be used for this, care being taken that it does not scratch. A warm solution of soft soap is advisable if the solution is not strong and the car immediately rinsed afterward. If using ordinary washing soap, a very weak solution should be made, as the lye contained in the soap reacts on the varnish. After sponging the body carefully, changing the dirty water several times, the running gear may be attacked with more vim. Scraping underneath the fenders is often necessary. It won't hurt the car there, but don't do it in any other place! Sponge carefully between the spokes and the spokes themselves. A different sponge—a coarser one—should be used for the lower part of the machine. The rear axle housing, the front axle and cross-roads—these must all be gone over with care. Having sponged the car it should then be rinsed, flowing the water, and then drying and polishing with a clean chamois; using a good grade chamois on the body, and roughly going over the lower part with a poorer one. The windshield should also be washed and chamoised. Some tops will admit

that is, the sponge filled with water and then pressed against the mud, expelling the water and softening the mud. This method is somewhat slow, but it must be followed where there is no running water, and is far better than scratching the varnish and doing a poor job.

Don't forget to charge a proper price for your work. A dollar for a wash on an ordinary five-passenger car or smaller is about right, and a dollar and a half for washing and polishing. This includes dusting the interior, cleaning the top, cleaning and polishing the dashboard and its parts, speed levers, lights and all brass or nicked work. For a smaller car less may be charged for polishing and more on a larger.

Some Points on Ford Ignition—2

The symptoms of a carbon deposit are back-firing and knocking in the cylinders—as if the spark were too far advanced. Another almost infallible evidence of excessive carbon deposit in the cylinders is the motor showing plenty of power at high car speeds, but a lack of power when hill-climbing on high gear. At slow engine speeds, the incandescent carbon projections serve to pre-ignite



the charge; thereby reducing the power of the motor. The cure is to take off the cylinder head and scrape off the carbon deposit from the top of piston and inside of cylinder head.

Carbon will also form on the porcelain portion of the spark plugs; thereby furnishing a circuit which the high tension current may travel over rather than jump between the sparking points of the plug. Usually, only a part of the current will pass by way of the carbon film, still leaving a weak spark at the points which, in open air, when testing plugs may seem strong enough. This causes intermittent firing. The symptoms are similar to a poor contact

point is reached at which the motor develops the maximum speed. Too close contact between the adjusting screw and vibrator will cause the current to "arc" between the platinum points, thus hindering the flow of current, burning away the platinum and often putting the coil out of action. This may be remedied by cleaning the points with fine emery cloth. If the platinum points become pitted or worn so that imperfect contact is made they should be filed flat with a thin watchmaker's file, so that the surfaces meet each other squarely.

With the vibrators properly adjusted, if any particular unit fails, or seems to develop only a weak

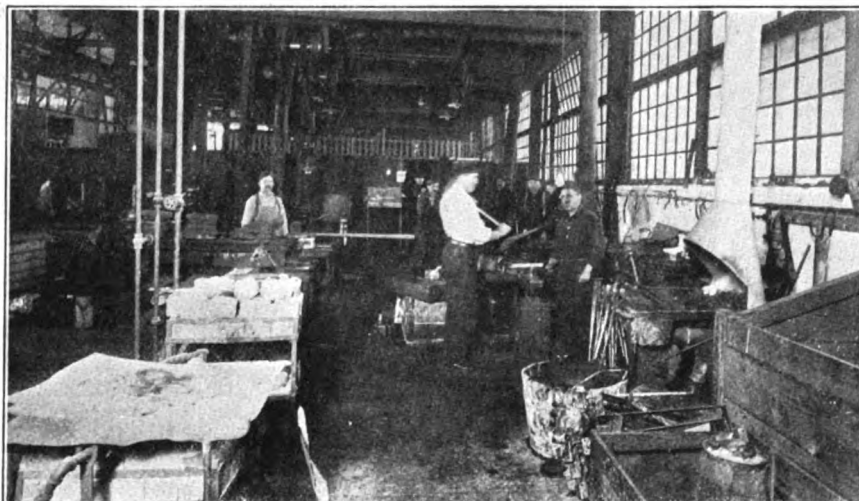
To remove commutator, unscrew the cap screw which goes through breather pipe on top of time gear cover. This will release the spring which holds the commutator case and fibre in place and these parts can readily be removed. Unscrew lock nut; withdraw steel brush cap and drive out the retaining pin. The brush can then be removed from the cam shaft.

In case the fibre, contact points and roller are badly worn the most satisfactory remedy is to replace them with new parts. The spring should be strong enough to make a firm contact between the roller and the points.

In replacing the commutator, crank the engine over until No. 2 inlet valve opens wide; then turn the crank just enough to bring the valve two thirds of the way on the down stroke; set the commutator so that the lead rod connection is in a vertical position.

Leaky valves make themselves manifest by loss of compression, easily discoverable in cranking the engine.

For grinding purposes, either ground glass or fine emery is commonly used. A convenient way is to put a small amount of emery in a suitable dish, adding a spoonful or two of kerosene and a few drops of lubricating oil to make a thin paste. Place the mixture on the bevel face of the valve, put the valve in position and rotate it back and forth (about a quarter turn) a few times, then lift slightly from the seat to change the position of the valve and continue the operation until the bearing surface is smooth and bright. The valve should not be turned through a complete rotation, as it is apt to cause scratches running around the entire circumference. When completed, the valve should be removed from the cylinder, thoroughly washed with kerosene and the valve seat wiped out thoroughly clean. Extreme care should be taken that no abrasive substance gets into the cylinders. If the valve seat in the cylinder is ridged or in bad shape it is best to have the seat re-trimmed with a valve seating tool. This operation requires considerable skill, and care should be exercised against making too deep a cut, necessitating re-timing the valve.



THE BLACKSMITH SHOP IN AN AUTOMOBILE PLANT IS AN IMPORTANT DEPARTMENT

commutator. This condition is difficult to detect, for the reason that when the plug is subjected to the usual test of removing it from the cylinder and closing the electrical circuit the spark is seen to jump free and "fat" between the points. This, because the electrical energy which is sufficient to jump between two points one half inch apart in the open air will jump less than one sixteenth of an inch in the chamber under 60 pounds' compression. If there's any carbon on the spark plug porcelains, clean them.

Coil Adjustment

The usual method is to turn the adjusting screw down until the vibrator stops buzzing; then turn the screw back slowly until a good spark is obtained. It is important to have all the units adjusted alike, and with a little experience you will be able to "feel" by the explosions when the

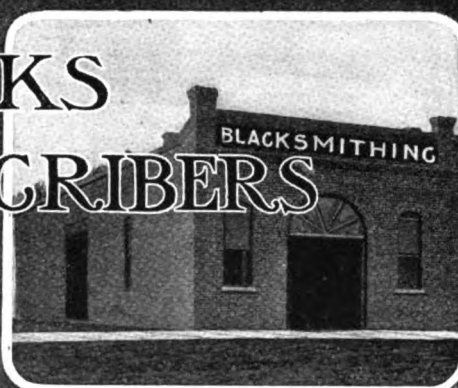
action, change the position of the unit to determine if the fault is actually in the unit. Remember that a loose wire connection, faulty spark plug or worn commutator may cause irregularity in the running of the motor; points that should be considered before laying the blame on the coil. The first symptoms of a defective coil is the buzzing of the vibrator with no spark at the plug. A leak in the condenser is often indicated by a "fat" bluish spark, but to make sure this is the cause of the trouble put a spark gap of about one thirty-second of an inch between the secondary wire and plug. If the condenser leaks, the spark will be irregular at the gap.

Commutator

The commutator should be examined when ignition trouble arises, to see that the roller makes proper contact with each point.



TIMELY TALKS WITH OUR SUBSCRIBERS



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Ever since the beginning we've always preached, "blacksmiths at the first table." That is—a paper for readers first, last and always. And that has meant not only the Editorial reading pages but the advertising reading pages as well. In order to publish what "Our Folks" want and need in the Editorial pages we have from time to time called upon our good folks for suggestions as to articles and subjects, and in consequence we are in almost daily receipt of new ideas and new wants.

Now we want similar help and assistance in the advertising reading section. We want to make the advertising pages a reliable guide and reference for anything used in, around or about a smith or vehicle shop. We want the advertising pages to answer your questions of "where can I get this, that or the other machine, tool or item of stock or equipment?" And to make the advertising section such a guide we must have your help. Look through the advertising pages, carefully, from front to back. Then note if there is anything you use, anything you have in your shop, that is giving satisfaction but which is not advertised in these pages. What we want to know is this: Is there any item of equipment or stock not advertised in "Our Journal" that ought to be? Let us know—please. Let us know what you think of the tool, machine or other item. We want to make the advertising section as valuable and helpful as the reading section—will you help us?

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Profits and Prices

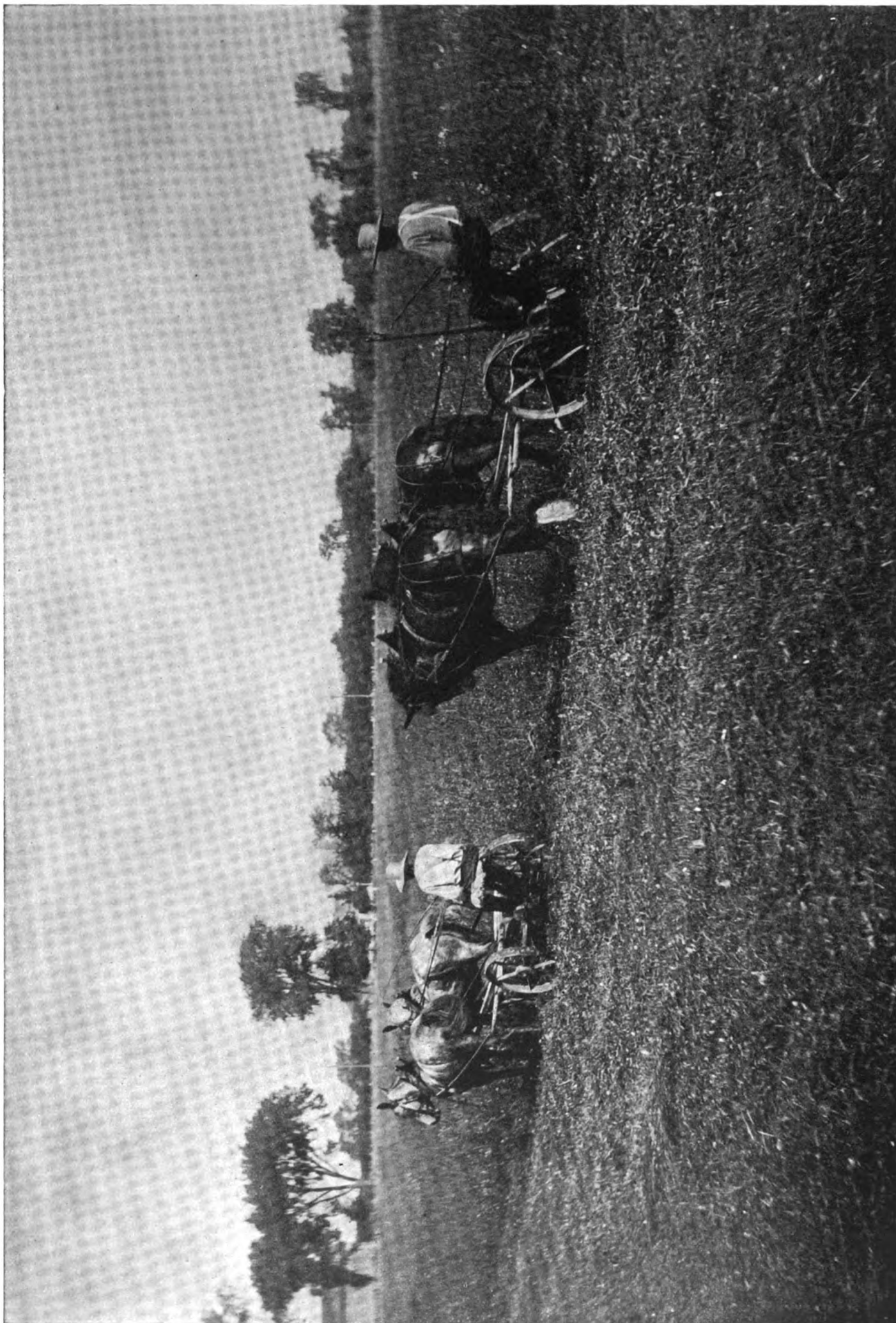
When a man knows what a thing costs him, not only in first cost but in full, he is not likely to sell it at a loss. When a smith knows his cost of doing business, when he knows the true and actual cost of his goods, stock and material, and as a consequence knows the real and full cost of his work, he is not likely to charge less than cost for his services. The articles on business and business systems are for the purpose of teaching "Our Folks" how to do business on business principles. How to get full value for their work. How to turn loss into profit. BUT—those articles will never affect your business unless you study and heed them. Thousands of our readers are reading these articles and are following the suggestions made. We want every shop owner to follow their examples. We want every smith who has the good of the trade at heart to help in this campaign for better business conditions. Let us make 1914 the year of "Better Smith-Shop Methods."

How One Smith Is Raising Prices

There are a number of ways of raising prices, but none except the cost-plus-percentage-of-profit has the real stay-put ability. And this is most forcibly brought to our attention by a letter which we received some time ago. This subscriber, when sending his subscription at the long-time rate, writes: "I want to get my neighbor smiths to reading **THE AMERICAN BLACKSMITH**, so we can get better prices for our work."

There is a good idea, Mr. Reader. Wouldn't it be a fine thing if your neighbor smiths knew as much about prices, costs and profits as you do? Wouldn't competitive prices go up if your competitors knew how to figure costs and profits? And wouldn't it be easier for you if there wasn't any price competition with your neighboring smiths? Why, if your competitors are of the right kind, it would pay to send the paper to them for a few months at your own expense, just to let them know that they are on the wrong track. Wouldn't it be a good idea? And we would help you. Just send us the names of those of your competitors who are not now reading "Our Journal." If you really want better prices, and simply find your competitors in your way, send us their names and addresses—we will co-operate with you—we will help, and you'll be surprised to know how much such co-operation will accomplish.

Will you help us help you?



THE HORSE IS STILL THE FARMER'S BEST FRIEND



Painting and Finishing Business Wagons and Trucks

A. F. GRALING

IN painting wagons and trucks from the new wood the item of chief importance is to get the wood saturated with a sufficiency of pure, raw linseed oil, carrying enough pigment to prevent the oil from striking too deeply into the wood. For this purpose perhaps there is no better combination of pigment than two parts of white lead ground in oil and one part of finely ground yellow ochre. Use just enough pigment to stain the oil and check its penetrative property.

For the second coat, take of the color chosen for the finish of the vehicle and use in the mixing $\frac{3}{8}$ oil to $\frac{5}{8}$ turpentine, with a gill of good coach japan added to $\frac{1}{4}$ gallon of the paint. On this coat when applied and dried out firm and strong, putty all necessary parts, using enough of the color in the putty to bring it out to the proper shade or tint. If the body of the wagon has any coarse-grained, open-textured wood, such places should be glazed over the priming coat with the ordinary carriage putty, cut to a glazing consistency with turpentine. Use a $2\frac{1}{2}$ -inch blade putty knife and make the putty thin enough to work readily from the knife. Press the glazing material firmly into the wood and remove the surplus material in order to reduce sandpapering to a minimum. Over the second coat of paint use the finish color in the form of color-and-varnish for ordinary grade work. For a better grade use an additional coat of flat color and then the color-and-varnish. Deaden this color-and-varnish coat, when dry, with a tuft of curled hair obtained from the trim shop, and stripe and finish.

Over old surfaces no painting should be done until all scaly, shelly paint has been sanded and scraped off and a solid surface exposed. Then carefully proportion amount of oil

for the first coat to the condition of the surface.

The Surface for Business Wagons

The heavier type of business wagon, and the class that usually comes to the village or country painter, need not necessarily be coated up with roughstuff, unless the surfaces are unusually large. When not to be roughstuffed, prime as above advised and glaze the surface carefully with glazing putty. Then when this has hardened sufficiently, sandpaper it very smooth and coat up with color, sandpapering between coats to knock off all nibs and dirt atoms and to keep the surface smooth.

To use roughstuff for this work, apply over the primer a coat of roughstuff mixed with three parts lead and two parts filler (by weight), mixing it to a stiff paste with coach japan and rubbing varnish, equal parts, and thinning to the proper consistency with turpentine. After 24 hours, sandpaper smoothly and glaze with glazing putty. After another 24 hours, apply a coat of quick roughstuff, following nine hours

later with a second coat of quick stuff. Then, in due time, face down this surface with rubbing stone and water.

Using Elastic Varnish

For the permanent good of truck, farm and business wagon painting, (the paint surfaces of which are built up largely of elastic pigments), elastic varnishes, rather than the quick, hard, drying ones, should be used. This, of course, is contrary to ordinary practice, but it is nevertheless founded upon experience. To coat elastic surfaces with hard, inelastic varnishes is simply another way of sowing the wind to reap the whirlwind, and results in cracked and fissured surfaces. The elastic foundation carried through to the varnish stage should have an elastic varnish to protect it. This provides requisite harmony from the first to the final coat.

The small or jobbing shop painter will find it most economical to buy his varnish in small cans, pints and quarts, as the needs for various quantities arise. Provide a good rubber stopper for the can in use

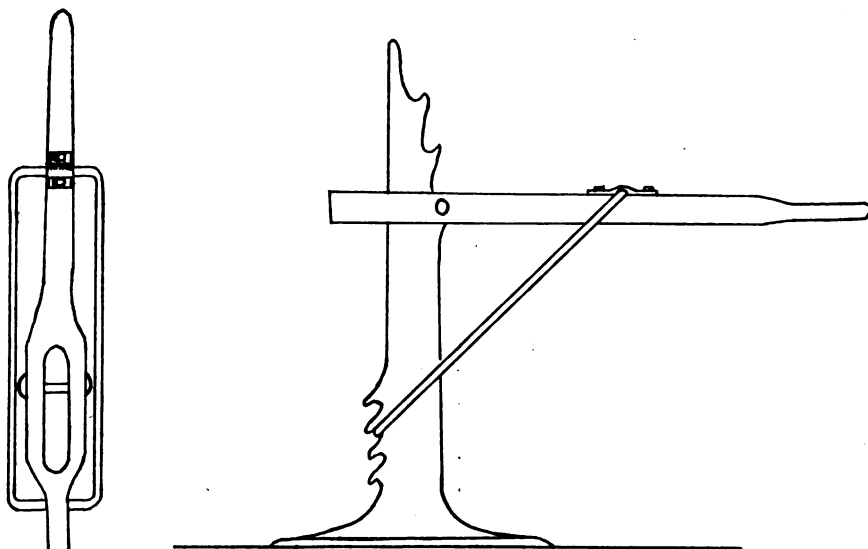


FIG. 1—A SIMPLE, STRONG JACK FOR USE IN THE PAINT DEPARTMENT



and keep the varnish in a clean, temperately warm place. Large cans of varnish unless used up quickly soon thicken by reason of its natural evaporation and so it soon requires an addition of turpentine to permit its proper use. This destroys the luster and brilliancy to a considerable degree, and best results are impossible. Lack of proper handling of varnish is more often responsible for poor results than are the surroundings and local skill and conditions generally.

Hints, Facts and Formulas

The best way to paint the canvas-top wagon is a vexing question in the average country shop where this wagon is a frequent visitor. Here is a suggested formula to try on the next canvas top that comes in: Treat the new canvas top with two sizings of hot glue water and allow about twenty-four hours between each coat. Then apply a coat of white paint mixed as follows: white lead, ground in oil; $\frac{5}{8}$ raw linseed oil and $\frac{3}{8}$ of a half and half mixture of coach japan and turpentine. This should reduce the lead to a brushing consistency. For the second coat of paint, after an allowance of five days for the

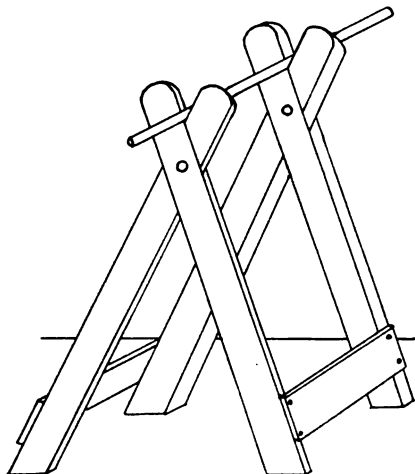


FIG. 2—AN EASILY MADE WHEEL HORSE

first one to dry, mix the lead in $\frac{1}{4}$ raw linseed, $\frac{1}{8}$ coach japan and $\frac{5}{8}$ turpentine. Allow three days for proper drying, and then sand off lightly and apply white color and varnish. Rub this coat sparingly, letter and ornament and, in due time, finish. For a quicker finish add four ounces of white vitriol in a gallon of water and use bolted whiting until a spreading consistency is reached. Coat top and

curtains and apply the desired paint directly upon this whiting-vitriol foundation and finish in the usual way. This develops a quick, clean finish at less expense than the regular glue size formulas.

The next suggestion is one that some painters may think rather unnecessary. It is this: Strain your colors and varnishes. This little matter of straining your materials may make just the difference between a good job and a poor one; and especially is this true when materials have stood for any length of time. Try as we may, dust and other foreign matter will accumulate and somehow get into the seemingly tight-closed can. Cheese-cloth cut into eight-inch squares, and clasped over the paint or color pot, furnishes useful strainers. Varnish should also be strained as a matter of precaution. The best carriage body finishers in the country, the men who turn out works of art in the leading shops and factories, invariably strain varnish before using. If a good practice for the specialist, why not equally good for the painter in the small shop where conveniences and facilities are, at best, not conducive to mirror-like surfaces?

The average small shop painter is very likely, when using carmine, to use more of this color than is usually necessary when preparing this beautiful pigment for use. The main consideration is to get the ground color as perfect as the glaze coat should be. When a perfect ground is obtained, all the glaze coat is expected to do is to enrich and bring out the beauties of the ground color. For this purpose, only sufficient carmine is used to stain the varnish strongly—a proportion of about $\frac{3}{4}$ of an ounce of carmine to a full $\frac{1}{8}$ gallon of varnish. Used in this proportion the glaze coat works freely, flows out well and displays a good measure of brilliancy.

The shop mixed black-color-and-varnish—and in the country paint shop this is a common article—all too often carries too much color in proportion to the quantity of varnish. The result is a mongrel surface—an unfortunate medium between a dead color and a surface of great brilliancy. And over such a color the varnish is pretty sure to crawl when the temperature is not

quite right. Varnish color, whether shop mixed or bought of the varnish maker ready for use, should carry sufficient varnish to furnish a surface of good brilliancy both at the

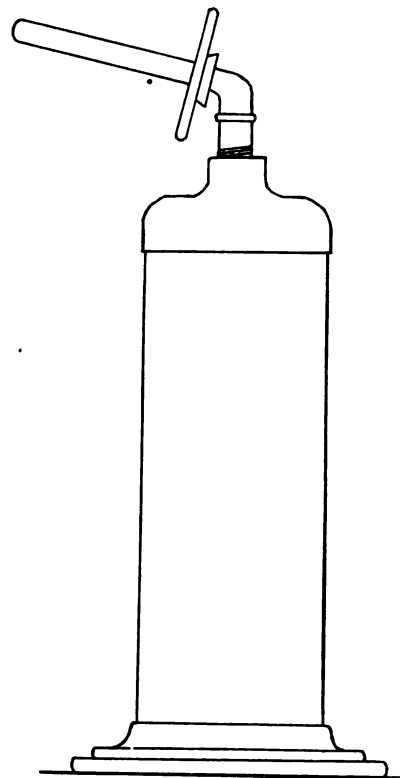


FIG. 3—ANOTHER WHEEL HORSE OF GOOD DESIGN

time of application and when it is dry.

A good, sure putty for the jobbing painter may be made of three parts dry white lead, one part gilders' whiting, and equal parts of quick rubbing varnish and coach japan. This putty will dry to sandpaper freely in 24 hours. A putty especially intended for deep holes and cavities is made of one part dry white lead and three parts whiting mixed in equal parts of raw linseed oil and coach japan. With this mix in enough plush woof, picked carefully apart, to give the putty great adhesion. At the bottom of the hole drive some tacks and then crowd the putty into the cavity, filling it nearly level with the surface. With the point of a penknife slash the putty a couple of times quite deeply to hasten drying. Then, when this bulk of putty has dried hard, re-putty, filling level with the surface and using the regular hard drying putty as above described.

The country painter is bound to get some old carriage or wagon



surfaces badly cracked and fissured which the owners want fixed up in the best way possible on the old paint. Take equal parts of rough-stuff filler, dry white lead and whitening, and mix to a stiff consistency with equal parts of coach japan and quick rubbing varnish. Apply this mixture with a stiff bristle brush, working the pigment well into the cracks. Let the mixture stiffen up considerably, and then with a 2½-inch blade French scraping knife work over the surface, pressing the pigment well into the fissures. Permit this to dry for a couple of days, and then rub out with a block of composition rubbing stone dipped in raw linseed oil instead of water. After rubbing out, allow the surface 24 hours in a warm, dry air to season, after which it may be brought to a finish in the usual way.

Information imparted to the owners of vehicles, like bread cast upon the waters, may, after many days, return with profit threefold. Do not be afraid, therefore, to give special

more, the owner should know that the carriage, newly finished, should not be washed in the sun. In washing, employ a clean, soft sponge and a chamois skin absolutely clean and devoid of lint. Use plenty of water, and arrange to flow the water gently down over the panels or surface so that the dirt accumulations will soften up and wash off the surface without injury to the varnish. Wash the running parts just as carefully as the body and wipe dry with the chamois skin. Mud accumulated upon the recently finished vehicle should be washed off immediately. Wash the recently varnished carriage frequently—it hardens the varnish and increases its brilliancy.

Labor-Saving Appliances

In order to handle farm wagon and truck equipment economically and with a minimum of labor it is necessary to have heavier and somewhat different devices than are used in the average carriage paint shop. In Fig. 1 is shown a very simple yet strong jack. This can

appliance as the one shown in Fig. 3. This latter wheelstand can be made to handle the heaviest wheel that comes into the shop. It is made of suitable sized pipe and flange fittings—depending upon the size and weight of the wheels to be handled. The standard of the appliance is then weighted by filling the pipe with gravel or iron filings or any other cheap or waste material. Or if the stand can be permanently located in some well-lighted spot in the paint room it can be bolted solidly to the floor.

In Fig. 4 is shown a gear trestle that will carry the heaviest vehicle likely to come to your shop. It is fitted with extension posts, so that after being placed, the gear can be raised to an easy working height. This trestle is easily and cheaply made, and if any considerable amount of painting is done it will save many a backache. The trestle may be made of any suitable-sized pipe, depending upon the weight of work usually done.

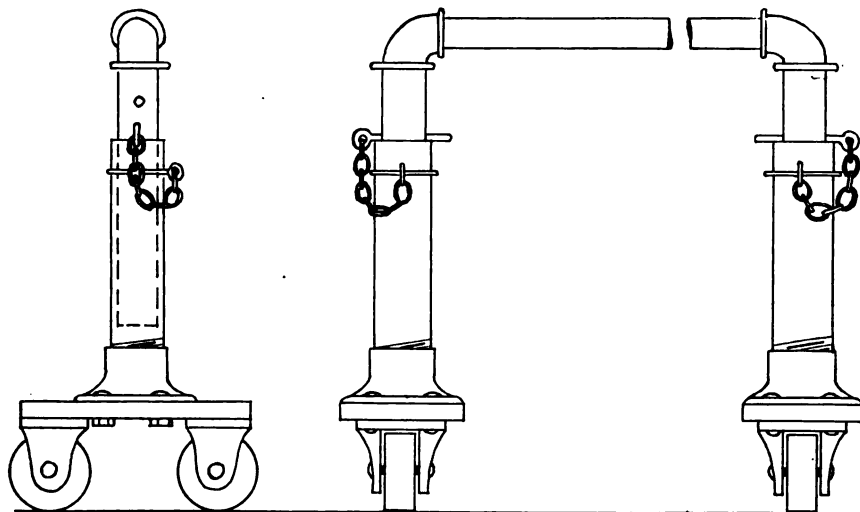


FIG. 4—A GEAR TRESTLE STRONG ENOUGH TO CARRY THE LARGEST GEARS

Pointers for the Automobile and Vehicle Painter

F. H. BREEMER

One of the first laws of the paint or varnish shop is "keep the surface absolutely clean." A perfect, finished surface is impossible unless an absolutely clean surface is had before starting. Dust, dirt and particles of foreign matter must be carefully guarded against, especially just before applying the finishing coat.

A handy kink that may prove of considerable practical value to the jobbing shop painter is to apply a slight quantity of oil or varnish to the tips of the duster just before attempting to dust off a job. This usually facilitates the dusting, in that it enables the duster to gather the dust and hold it, instead of just brushing it along or into the air, only to fall back again upon the surface you want dustless. An easy way to apply the varnish or oil is to pour a small quantity into the palm of the hand and then brushing lightly over it with the duster. If too much oil or varnish gathers on the duster, just brush it over a newspaper two or three times until the surplus is removed.

advice to your patrons relative to the care of the carriage. If anything, this information is more necessary in the country than in the city. In the first place acquaint the carriage owner with the fact that the carriage house or apartment should be a clean, dry, light and well ventilated affair, entirely separate from the stable or from the corrosive effects of the manure pile. Nothing destroys varnish so quickly and so permanently as the ammonia contained in horse manure. Further-

be made very easily and cheaply or, if preferred, good jacks can be purchased from any supply house. There are a variety of patterns, styles and grades to satisfy most any personal ideas and any purse. But perhaps the most important consideration is to purchase a jack that will be strong enough for the work required of it. Don't endanger your life by using cheap, unreliable jacks which may break at a critical time. A simple wheel horse is shown in Fig. 2. This, however, is not as handy an

To soften hard brushes, for which there should be no excuse in the progressive shop, soak in kerosene oil in such a way as to keep the bristles well down in the oil, but not touching the bottom of the can or container. A good way to do this is to suspend the brush from a string and hook so that it will be a half inch or so from the bottom of the oil can. This will usually soften the most persistently hard brush if left to soak for a sufficient time.

Before leaving this subject let me mention that ever-timely caution; to have the surface to be varnished and the varnish itself of as near an equal temperature as possible. A temperature of about 75 degrees is proper for the varnish room, and this temperature should be maintained until the work is finished and ready to leave the shop.

Some Pointers on the Painting of Farm Wagons

L. J. KERNS

As a great many readers of "Our Journal" are interested in the beautifying of the common farm wagon, perhaps my system will interest those of "Our Folks" who have a paint department connected with their shops.

As in all painting the first and most important thing to do when the job arrives in the paint shop is to prepare the surface for the first coat of oil and pigment. The linseed oil coat is best applied before the irons are fitted, as it is then much easier to clean off the grease and soot marks usually left by the smith.

In effacing these marks, use cloths saturated with benzine and wash the surface lightly. This will remove any grease and oil, and if afterwards wiped dry with a clean cloth the surface will appear clean and be ready for the first priming or pigment coat which should be somewhat like the finished shade. Putty all holes and crevices after applying the priming coat and then apply a lead coat as much like the finished shade as possible. The color and varnish coat is next applied, after which the striping and finishing may be done, but if an extra coat of color and one of varnish is needed the

finishing is done before the last coat of varnish is applied.

Some of the most popular colors for farm wagons are a red running gear with a green body or yellow on the gear with a brown body.

A beautiful brown can be made by mixing five parts of Indian red with one part of Prussian blue and enough yellow added to give it that richness so much desired in the browns.

Right here might be said a word of warning—don't mix your paints hurriedly, as they will not last as they ought to and as they would if more time were taken in the compounding.

The Business from a Practical Smith's Viewpoint—4

H. M. TOTMAN

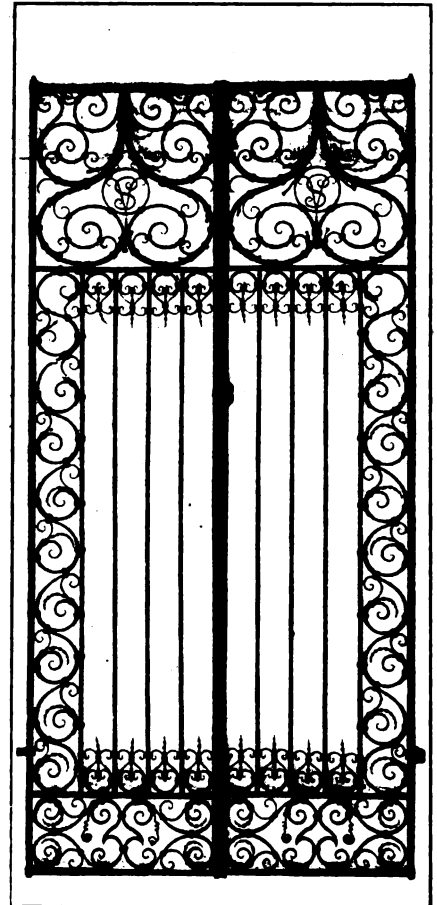
System

System, which means a definite, orderly plan for the accomplishment of an end, is of just as much importance in the custom shop as in the great factory with its hundreds of employees. Furthermore, system is the exercise of brains in solving the problems which continually confront us. In these days of close competition, the difference between profit and loss may be the employment of systematic methods.

To begin with—a stock book is desirable in which is indexed every article used in the shop—giving a page or more to each item. When buying a bill of goods it will refresh the memory and assist us in remembering to order articles needed which we would otherwise forget or overlook. A stock room properly arranged is a great economy. Everything should be kept under lock and key, except broken packages of bolts, etc., which should be kept in large commodious sacks with the sizes plainly marked on the outside; and it is a good plan to have one of the bolts fastened on the outside by a staple. Spokes should be placed in a rack, with the smaller sizes on the lower part of the rack as they are more often needed. Shafts can be swung overhead, so that you can see at a glance the amount of stock on hand.

Paints and varnishes are very liable to be missing when wanted for use, so that it is well to have only opened cans in the paint shop. The writer has known of more than one suit of clothes made from carriage

broadcloth; therefore, better keep the pieces of cloth in the stock room. It is also a good plan to have a sheet of paper on the wall of the stock room on which are entered purchases, and when stock is used it can be checked off and a glance will quickly show the amount of anything on hand, thus preventing running out and avoiding the necessity of telegraphing for stock, via express, to



A PLEASING COMBINATION OF SCROLLS AND STRAIGHT BARS

say nothing of the delay to the customer.

When a large order is to be given it is a good plan to send to several good jobbers for prices; one will save money by doing this. The weighing and measuring have been mentioned in a preceding article. When buying staple goods be sure to guard against substitution. It may be that some other brand is "just as good," but it will usually be found that the substitute costs the dealer less money.

Much waste is experienced in cutting stock and in not caring for it properly. This is especially true in the trim shop, and should be



carefully watched. We find it profitable to have a notebook to jot down prices quoted by salesmen; although not in need of the goods at the time it is a good thing to have and to refer to when considering purchases.

(To be continued)

A Blacksmith's Skill as a Surgeon

The following item appeared in an Australian newspaper and was sent to us by one of our good friends in the Island Continent. It is not only interesting as an item illustrating a smith's skill, but also as an article on the cure of sidebones.

A blacksmith named James A. Shanahan, of Gymbowen, near Hortham, has just made a valuable discovery relating to the treatment of sidebone in horses. Having a valuable animal suffering from this defect, he consulted officers of the Department of Agriculture, private veterinary surgeons, and read standard publications dealing with the subject, but found that the necessary operation had been recorded as only having been done on the Continent, no details being given. He set to work himself and made an improvised lancet, chloroformed the horse, made an incision about three inches long from the top of the coronet, and with a home-made knife removed the bone, which was $1\frac{1}{2}$ inch long and in five pieces. Thirty days after the operation the horse was able to gallop, but six months passed before the horse was really fit. Now there is no sign of a fresh growth of bone, and the horse is well and active, having gained over £25 in cash prizes since the treatment and the operation, which is claimed to be the first of the kind in Australia.

Obtaining and Selling Judgments Against Debtors

Here is a letter upon a subject of interest and importance to every business man:

E. J. Buckley, Esq.:

Dear Sir:—I am writing to inquire whether an association can advertise judgments for sale, and how same can be accomplished?

If not asking too much, will you kindly send me a form of such an advertisement, and oblige,

Yours respectfully,

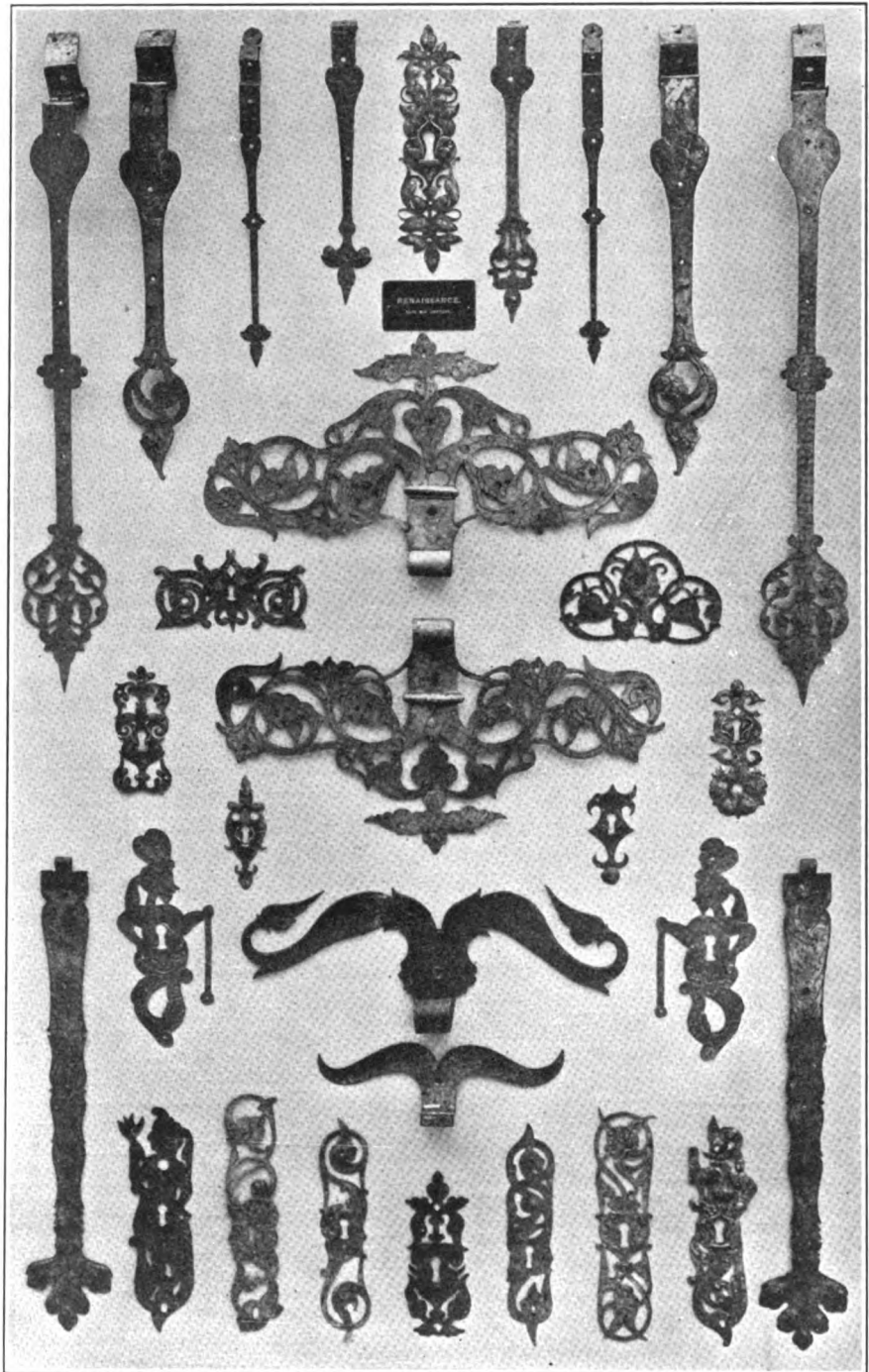
M. EDWARD TONER, Secretary.

The reason the subject is important is that the right to sell a judgment against a debtor gives a creditor a weapon that

in many cases is more potent than any other. I have seen many a debtor who knew all about the collection law, who knew that he was execution-proof and had laughed at most of his creditors, climb immediately down from his perch when a creditor prepared to advertise a judgment

each thing properly may get the creditor into considerable trouble.

Obviously before a judgment can be sold, it must be obtained. Obtaining it means bringing an ordinary suit in debt before a magistrate or justice of the peace if the claim is within his jurisdiction: and before



THE WORK OF SOME OF THE OLD TIME SMITHS IS SURPRISINGLY GOOD

against him for sale in the local newspapers. The remedy, however, is not very frequently used, because most creditors hesitate to adopt it; they fear some legal reprisals on the part of the debtor.

There is absolutely no chance of successful legal reprisals by a debtor if the instructions I shall give here are followed. The proceedings for the sale of a judgment against a debtor are very simple, but every step is important, and the failure to do

the next higher court if the amount is too large for magistrate or justice of the peace. Usually these cases are not defended, and getting judgment is both quick and inexpensive.

After the judgment is obtained, as it will be—by default—if no defense is made, it must under the laws of all States lie for a certain number of days while the defendant is given a chance to appeal. This appeal period varies in different States. When it



has passed without appeal, the defendant is flat on his back so far as appealing or questioning the judgment is concerned.

Right here I want to point out the difference between disposing of a judgment, and disposing of a mere claim against a debtor which has not been reduced to judgment. When a debtor has been sued, and has failed to defend, and judgment has been given against him, and when he has had a chance to appeal, and has not appealed, he can never say again, "I do not owe that money," or "the account is wrong." If a judgment obtained in such a way is advertised for sale, his mouth is closed and he can bring no action for libel or anything else. If he brought such an action on the ground that he did not owe the debt, the court would say, "your time to raise this question has gone; you should have put in your defense when the suit was pending."

As compared with this, the risk of advertising a simple claim for sale, as is sometimes done, is that the debtor may be able to show that he doesn't owe it, or not all of it, and that in saying otherwise you have libeled him. The creditor may think that the debtor could not possibly have any defense, and that it is safe enough to advertise the claim, but defenses—and good ones—have been made before when the creditor did not think it possible, and it can be laid down as a rule that admits of

number of the suit in which judgment was obtained), to hold to his heirs, successors and assigns forever.

In witness whereof, I have hereunto set my hand and seal, this day of 1913 (Seal).....

Witnesses:

Now you have a solid, valid judgment, how shall it be offered for sale? It often helps to first send the debtor a registered letter, telling him you have a judgment against him, and expect to offer it at public sale if not paid by a certain time. Best not tell him where or how the advertising will be done; sometimes where creditors have named the newspaper, the debtor has used political influence to close its columns to the advertising. A judgment can be legally offered for sale in any medium which is legal for advertising anything for sale—a newspaper, a hand bill, or circular. Being property in the eyes of the law, it can be traded in like any other property.

But there are sharp limitations as to the way in which a judgment can be advertised. There must be no express or implied reflections upon the debtor; they would be libel. Nothing more than the bare facts must be stated, something after this form:—

JUDGMENT FOR SALE

I offer for sale judgment against John Jones, 21 Main Street, Cleveland, Ohio; amount, \$246.13. Judgment obtained by the undersigned in Court, December Term, 1913. See public record for particulars.

WILLIAM JONES, Blacksmith,
12 Adams Street,
Cleveland, Ohio.

Wording like this can also be printed on a hand bill or circular and posted or cir-

made in practically any shop having the few necessary wood-working tools.

After the bench is made it is fitted up with the wheel-holding arrangement at one end and the spoke-tenoning device at the other. The wheel-holding device consists of a long center bolt fitted with a handle nut, so that the wheel hub can be held rigidly. The hub is further steadied by being held against a V-shaped ridge by means of a Y-shaped movable piece that is fastened when properly adjusted, by means of a nut and bolt operating in a slot cut in the tail part of the Y. A plate screwed to the surface of the bench under the V and Y-shaped pieces protects the bench top from undue wear. A further steadying device and the spoke-driving mechanism consists of a standard fastened on the end of the bench top as at A. The spoke is held down on this

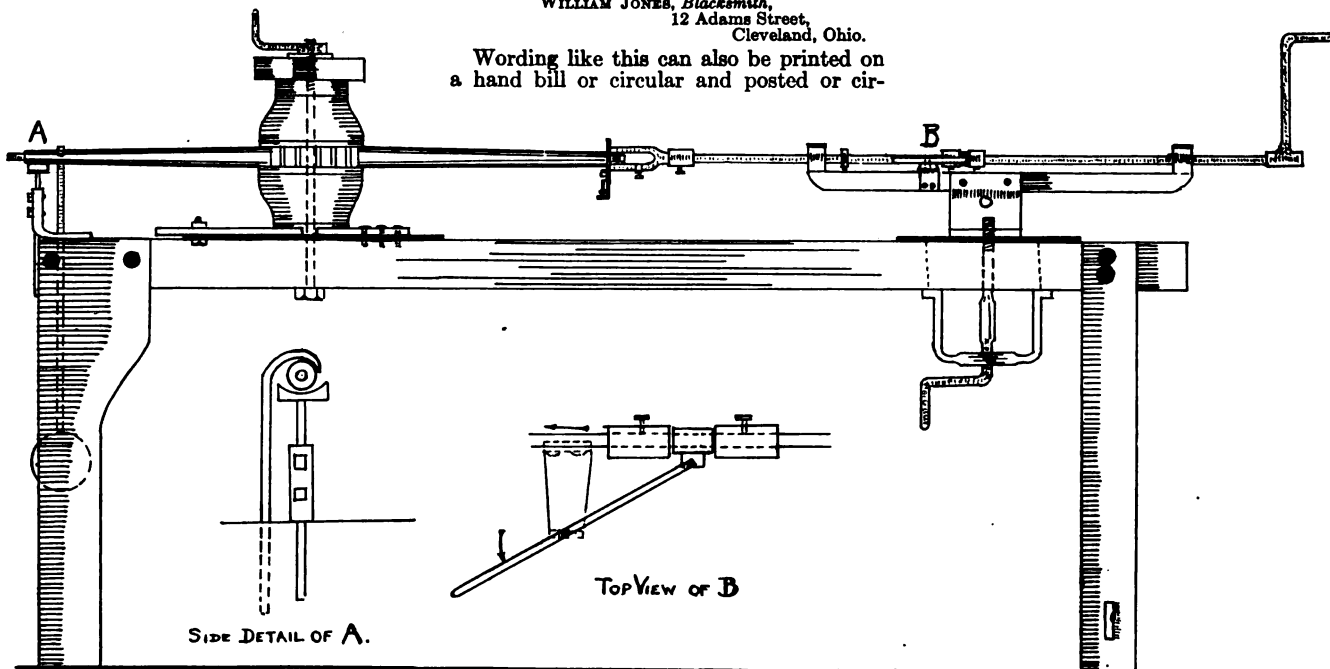


FIG. 1—A SIDE VIEW OF THE SPOKE-TENONING MACHINE WITH DETAILS OF PARTS

almost no exception, that no creditor should publicly offer a claim against a debtor for sale until he has gotten judgment on it.

To get back to the main subject, after the creditor has obtained judgment, he must assign it to his association before the association can legally offer it for sale. Of course the creditor can offer it for sale himself without assignment. Assigning is a very simple matter; the following is a short but effective form:—

In consideration of the sum of one dollar and divers other valuable considerations, to me in hand paid at and before the making of this assignment, I hereby assign, transfer and set over to.....

all my right, title and interest in a certain judgment for the sum of..... against..... of the City of..... County of..... State of..... obtained by me as of (here insert the terms and

culated anywhere the creditor wishes, either in the debtor's own neighborhood or elsewhere. It is a pretty thick-skinned debtor who can read a notice like this in his local newspaper or on a hand bill near his front door without doing something.

(Copyright by Elton J. Buckley)

A Shop-Made Spoke-Tenoning Machine

G. H. RICHARDSON

The accompanying engravings show a diagram and also a photographic reproduction of my spoke-tenoning machine. The bench itself can be

standard by means of a hooked rod, on the lower end of which is a ball weight.

The tenoning device consists of a shaft on one end of which is fastened the crank or handle for turning and on the other end is the hollow auger. Pressure is exerted at the auger end by means of a lever as shown at B. When the lever is pulled in the direction of the arrow, the shaft and auger are forced toward the spoke being cut. The crank below the bench top is to permit adjusting

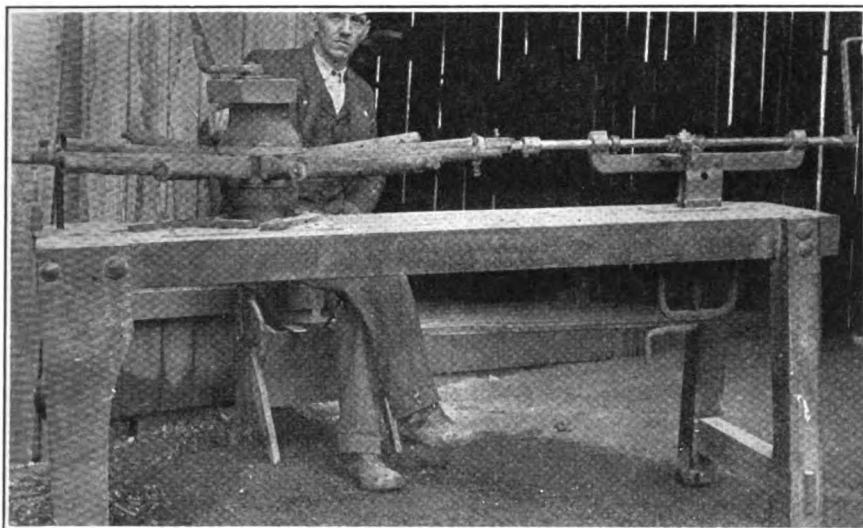


FIG. 2—SHOWING THE MACHINE MADE BY MR. RICHARDSON

the boring device for large and small sized wheels. There is also a plate fastened to the top of the bench under the boring device to prevent wear.

The dimensions of the bench top are four inches thick, sixteen inches wide and six feet long.

Necessary Oxy-Acetylene Welding Conditions

It has been proven that oxy-acetylene welds can be made so strong that the test bar will break outside of the zone of heat; showing that the weld is at least as strong as the original metal. Much has been said concerning this strength of the weld, and a strength nearly that of the original metal can be obtained with this process under the right conditions. In fact, in all welding, these conditions are to be observed.

First, the torch equipment should be adjusted to give a uniform flame under all conditions of temperature; burning the acetylene under the least proportion of oxygen that will give a clear outline of the high-temperature flame (interior cone). If more is supplied, the additional oxygen must pass through the high-temperature flame in its uncombined state and, coming into contact with the molten metal, practically oxidizes it instantly, which cannot help but affect the strength. As an oxidized weld will be brittle and may be weak, the mixture of the torch should be carefully observed. Careful attention should be

paid to the generators, as impurities in either of the gases will produce weak welds.

Second, the operation of the torch is an important factor. Unfortunately, using the torch appears to require little skill. The novice seems to think the movements of the torch are solely to spread the heat; whereas they are more necessary to spread the metal. The weld in steel is made by spreading each drop as thin as possible over a large area; being sure that the metal over which it is spread is hot enough for the two to flow together and that the edges of the drop, instead of being rounded like a drop of water, will be spread out as if the drop had been placed on a piece of blotting paper. It is also necessary to blow away the particles

or films of oxide, which are readily distinguishable, as they are much brighter than the metal.

The third factor is the material, fluxes and methods used. The melt bar or feed wire should conform as near as possible to the metal being welded. If it is of a lower tensile strength, or other variations occur, the weld must necessarily be weaker than the original metal. The most common fluxes are salt or borax, and these are used only in certain metals. Cast iron welds easier with a flux, and with steel it has been found to increase the strength of the weld at least 6 per cent if conditions warrant. With wrought iron, no flux is necessary, but the melt bar should be of soft iron. As pure iron is sticky and not very fluid it should be worked or stirred with the end of the bar into place.

Heat treatment should be given to both steel and wrought-iron welds. This consists in working or hammering the joints while cooling, so as to build up the structure that the melting has destroyed. High-carbon steel welds should even be annealed after the heat treatment, so as to build up the strength and elasticity of the metal that has been affected by the heat. Steel takes its structure from the highest temperature to which it has been raised. Unfortunately, the structure produced by the molten temperature is very coarse, which means a lower elasticity and increased brittleness. Consequently, the heat treatment is necessary.

Copper, brass, aluminum and other



THE FORGE SHOP AT WORCESTER POLYTECHNIC INSTITUTE



metals are special problems that should be attempted only after a proficiency in iron and steel is acquired.

To summarize: the strength of an oxy-acetylene weld and uniform results obtained are entirely a matter of satisfactory and uniform conditions, plus the operator's skill in applying these conditions properly.

Forge Practice at the Worcester Polytechnic Institute

JOHN JERNBERG

The aim of this department is to acquaint the student with the funda-

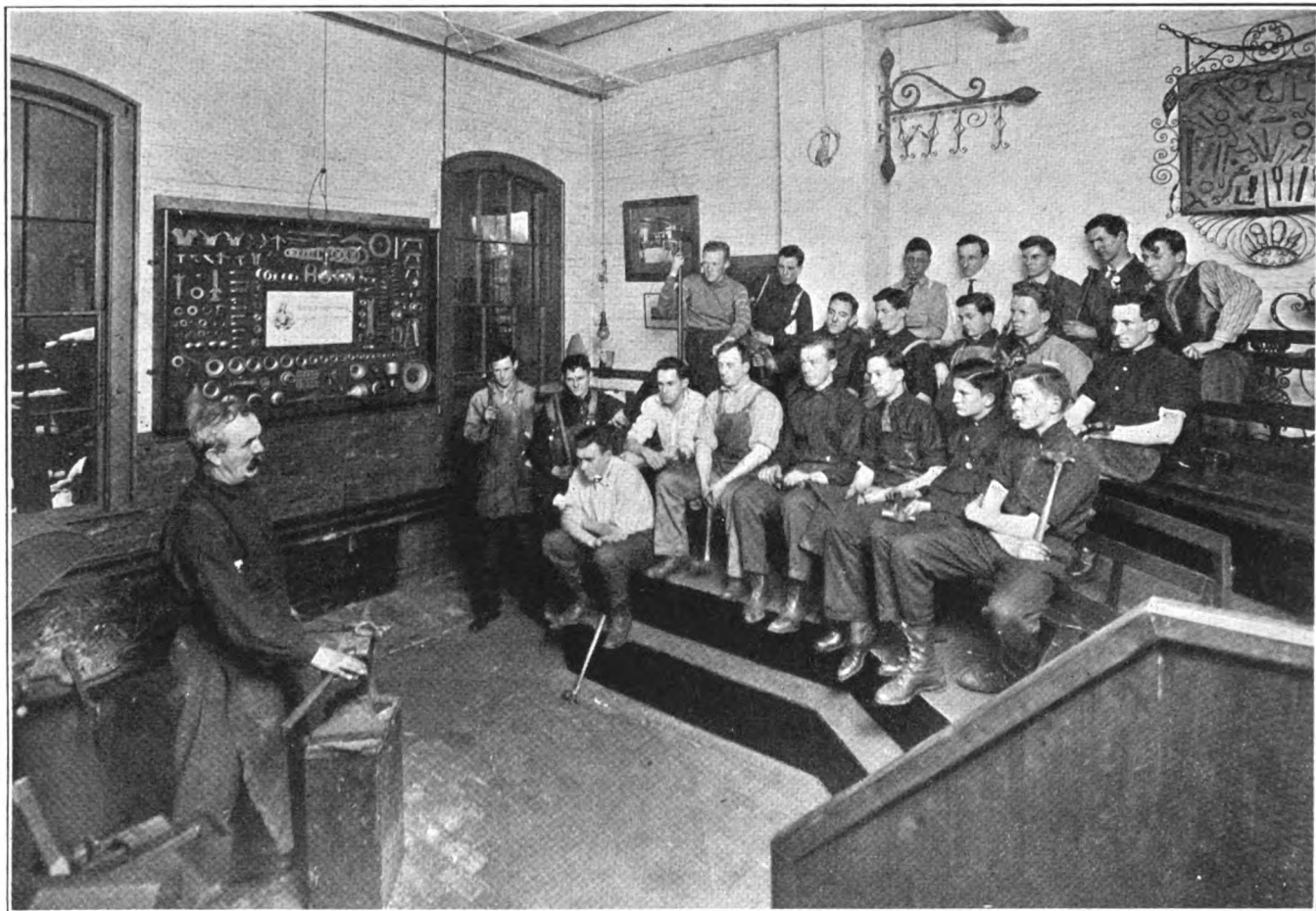
turn out accomplished blacksmiths, and the main object is, therefore, to teach the student to appreciate, first, neatness and, second, accuracy; bearing in mind that the latter is wholly a result of prolonged practice.

The beginner is taught the correct use and handling of blacksmith's tools and is then given the opportunity of using them on simple forgings—such as drawing a piece of iron to a point or an edge, making a correct right-angled bend, forming a ring and similar operations.

The next series of exercises takes up welding, with particular attention to preparing the fire for a welding heat and caring for the work in the fire so as to prevent excessive

restricted to the making of shop tools such as hammers, tongs, wrenches and cutting tools. In connection with this work, the student becomes familiar with the properties of carbon and alloy steels. Relative to carbon steels, the method of determining approximately the carbon content in the steel, the proper hardening heat and quenching fluid are thoroughly considered, also the restoration of overheated carbon steels.

In the heat treatment of high speed steel, the experiments are taken up with a view to obtaining not only the method of treatment, but also the degree of heat which would produce the best result accord-



THE LECTURE ROOM WITH DEMONSTRATING FORGE, AT WORCESTER POLYTECHNIC INSTITUTE.
NOTE SPECIMENS ON WALL

mental principles and methods of handling iron and steel at the forge. To accomplish this effect, a systematic series of exercises is pursued, each exercise illustrating one or more of the principal operations commonly met with in forge practice.

With the brief time devoted to this subject it is not expected to

oxidation and burning. For preliminaries the student must submit for approval some of the more common welds such as the lap, butt, and V-welds. A chain of some twenty links completes the welding exercises.

The work now advances into the junior year and assumes a more practical aspect. The exercises are

ing to the use for which the tools are intended and the expense of the various processes.

The last few exercises are devoted to the problems in coloring and casehardening of steels. The first is dismissed with a theoretical discussion of the formation of colors and several practical demonstrations.



ANOTHER VIEW OF THE FORGE ROOM AT WORCESTER POLYTECHNIC INSTITUTE

The latter is considered with slightly more detail pertaining to the carbonizing and heat-treating process. Several carbonizers are usually tried out at various temperatures and lengths of time, for the purpose of comparing the results produced on the steel.

In this work, particularly the latter portion of it, the student is expected to make notes of his observations and submit a final report giving a resumé of the exercises, experiments, results and conclusions.

Banking for the Blacksmith

T. J. LYNAM

The average blacksmith when he speaks of banking or of a bank immediately pictures in his mind a big stone building in which clerks at desks and behind barred windows take in money and occasionally hand it out; where a lot of books are kept and a lot of men take things pretty easy as far as work goes. About all the average smith knows about a bank is that it is a good place, generally speaking, to place his money, but except as a depository for savings or surplus he knows nothing more about it; and so when the time comes that he needs money to enlarge his business he must hunt up the loan shark or pay exorbitant interest to someone else.

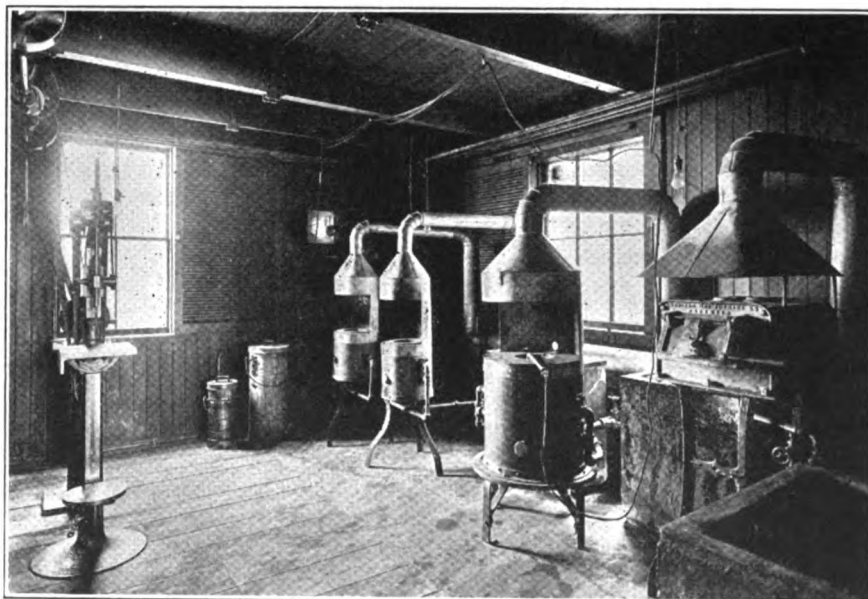
Now let us see how the bank can aid you and how you can establish a business standing at the bank.

In the first place make yourself known. Make a reputation for yourself at the bank for honesty, for square dealing, for promptness in meeting your obligations. Do this by depositing money in the bank. Make deposits daily, weekly or monthly, as the volume of your business permits, and check out against your account; being careful always to have money enough on hand to meet all checks fully. Occasionally let your bank know what you are doing, so that when you refer a jobber or manufacturer to the bank the latter can report accurately upon you, and thus you establish a basis of credit with your supply houses and others.

When the time comes that you need ready money go to your bank with a note, and if you have established your business standing on the right basis you will be reasonably sure of getting what you want. The amount you can get will, of course, depend upon the volume of business you have done; and, also, if the amount is comparatively large, the bank may request a detailed report of your business—be sure you can give it, with the necessary information accurately stated, not guessed. Of course, the man whose bank balance averages \$1,000 will naturally be accorded more credit than one whose balance averages but \$100. The bank decides the matter coldly and impartially from the business standpoint. It asks about two things: reputation and volume of business.

Suppose, for instance, that additions either in equipment or in building are needed. You want one, two or five hundred dollars. If your business standing warrant it the bank will take your note for sixty or ninety days at the legal rate of interest and will renew that note for a similar number of days. You can pay any part of the note and give a new one for the balance; and by the time the balance is due you will in all probability have the necessary cash to meet it—especially if you are really entitled to the credit.

And it's a good idea to borrow a small sum from the bank occasionally when you do not need it.



THE HEAT TREATMENT ROOM, WITH BATTERY OF FURNACES



If they refuse, you can afford to take your banking business elsewhere; if they let you have the money, you can pay it promptly and thus establish a foundation upon which you can get money when you really need it; and this standing at the bank to a man who desires to enlarge and grow in a business way is of considerable importance.

But be sure you can meet the demands of the bank when it makes demands, and be ready to give a detailed report on your business when the bank asks for it.

Thoughts on Timely Topics

By THORNTON

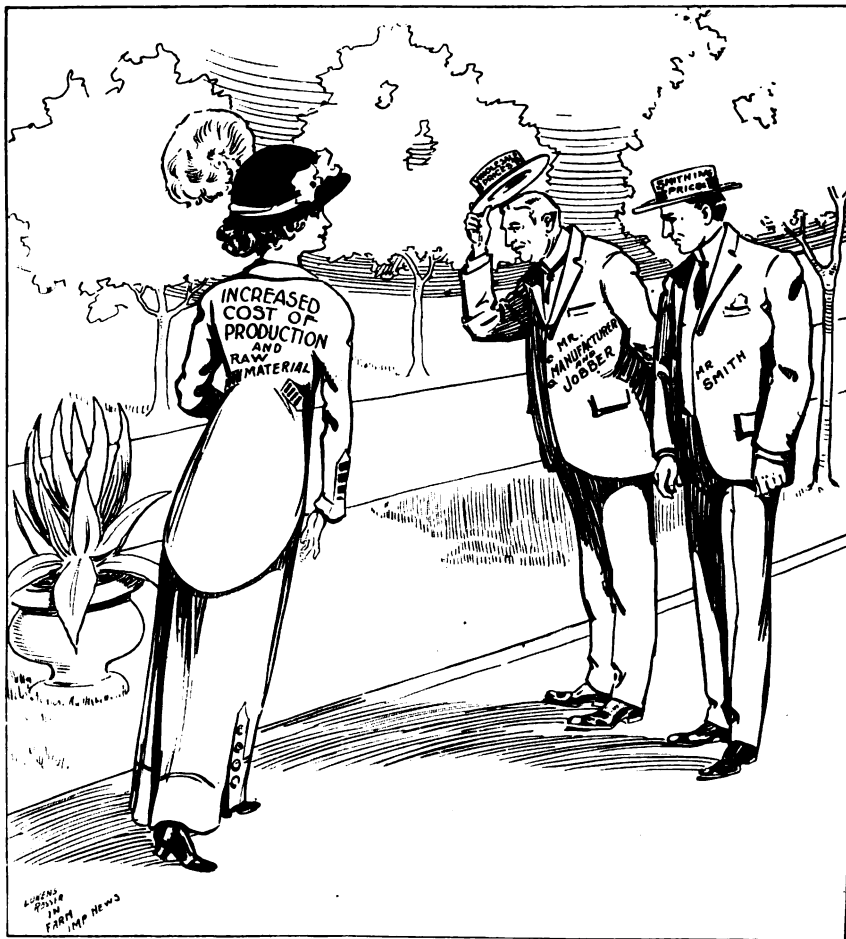
Caustic Censure and Cheery Comment

ONE OF THESE FAKIR CHAPS came into my place the other day with some kind of mystic hardening powder. What I gave him will keep him about as fat as a campaign promise after election. I cannot understand how right-thinking smiths can fall for the bunch of bunk that these fakirs hand out at so much per six-ounce bottle. One would imagine that some folks on this good old earth were especially picked by Providence to be the guardians of certain valuable secrets and were commissioned by the Almighty to dispense said secrets at so much per. Of course there are certain methods, certain materials and certain mixtures to use in the hardening of steel, but these things are not secrets today. Anyone that really and truly wants to know about them, and can read, can get more than the fakir will give him and at a fraction of the cost.

THE SMITH WHOSE HOBBY is the collecting, compiling and marking of ancient envelopes and scraps of wrapping paper with the current hieroglyphics of his business is about as good a business man as the one who hired a deaf mute to sell his music boxes. If business is worth the time necessary to carry it on, it is worth every bit of the time necessary to keep track of where you're carrying it. Of course there are businesses that aren't worth carrying out to the dump heap; but they are getting about as scarce as cheap nourishment these days. But how any man can consider it wasted time or drudgery to keep track of

his business is about as easy for me to understand as Sanscrit. Our excuse for business is money, and money means accounts, and accounts mean bookkeeping. Now—if someone can show me how I can know what my business is doing without my keeping track of things on paper in some form I'll be willing to buy buttermilk for the crowd. And what in the name of Vulcan is the sense of keeping track of a business unless you keep tabs on it correctly and in

men. They come as close to being real business men as the "Silkene" hose at 29 cents comes to being real silk. I tell you I almost lose my hat when it comes to the subject of keeping account of business. And when some hulk of a hoof-burning, muscle-knotted iron-smasher tells me what a tough job it is to take care of his books I just light into him like some of the has-beens used to when boxing was considered more of a sport than it is today. There's



WHY AREN'T BOTH HATS RAISED?

Mr. Manufacturer and Jobber is already well acquainted with Miss Increased Cost and, of course, he accordingly raises his hat. Mr. Smith, however, seems not to know the lady. Of course, both hats should be raised.

such a way as to make the information worth something to you? Some of these near business men remind me of the bush league players who are almost good enough to be in a big league club—but they ain't. Some of these near business men would have a big business if it wasn't for this, that or the other thing, when the only thing that is really keeping them out of being the owners of big business is the fact, hard and true, that they are not real business

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THIS LITTLE OLD WORLD OF OURS is certainly chock-full of inconsistencies. Some men will rip off reel after reel of high cost of living bunk and then sashay around to the general



store and get a package of fancy crackers, a couple of pounds of Battle Axe Cut Plug and about enough real food to keep the pet canary alive for perhaps a day. The other Saturday we saw a poor woman lugging home a basket of eatables from the market, and right on top was a big cauliflower that cost her at least twenty cents. A head of cabbage of the same size would have cost less than half as much and would have contained more real food value and gone just about twice as far. It's not so much the high cost of living that we have to blame as the high cost of enjoyment. And when I hear some big-mouthed, pop-eyed yap spout about the good old days of years ago I just hanker for the power to transport him to the days of my great-great-grandfather when they roasted carrots instead of coffee to make their dinner drink. A man will roar from whistle to whistle about the price of everything from aeroplanes to Zuni Indian feathers and then go out after supper and play poker until the cock crows. And during his repeated attempts to get back at a couple of professionals that have him tied to the board he will perhaps guzzle enough rot-gut to float the Imperator, and will have smoked up enough tarred rope to tie her to the dock. If some of these chaps would just drop five or ten percent of the coin they let go for painkiller and cards into the family exchequer their wives wouldn't have to do their own washing to keep down expenses.



Around Our Forge Fire

The Editor's Business Demonstration.

The Editor was busily engaged with his morning mail when a loud knock came at the door. In answer to the Editor's cheery "Come in," a large, stockily-built man entered.

"Mr. Editor, I suppose?" began the stranger, "I'm Jack Balfor of Fareham. Y' ain't never met me, but I've been takin' yer paper for nigh onto eight years now, an' I wanta tell y' y've put my business right on the map, so t' speak."

"Well, I'm mighty glad to know you, Mr. Balfor," returned the Editor, "and I'm glad, too, that our paper is helping you. How does it happen you're way up here in Buffalo?"

"I came in t' transact a little business with one o' yer manufacturers here, an' then, too, I thought I'd drop in on y' an' get some o' these here business kinks that ain't jes' straight in my mind, ironed out. I've been readin' that business stuff ever since y' started on that, an' I think yer doin' more real good with those articles on business than a whole school o' business college professors could do in years."

"What is it that puzzles you regarding these articles on business?" questioned the Editor. "I'm not an expert on the subject, but perhaps I can enlighten you."

"Well, it's jus' this," began Balfor. "I've been readin' as I said all about costs an' profits an' such like an' I'm workin' out the ideas and methods suggested jus' as fast as I can. Now, if I could see an actual demonstration of how to figure costs and profits I think it would make things easier for me."

"We can arrange that very nicely replied the Editor, taking up a sheet of paper and a pencil. Then, continuing, the Editor said: "We will take for our system the rules recommended by the National Association of Credit Men, and for our actual figures we will take an investment of \$2,500.00. Now the first rule suggested by the Credit Men is: 'Charge interest on total investment at the beginning of business year, not including real estate.' Thus we figure on \$2,500.00 at six per cent or \$150.00." And the Editor wrote "Int. on Investment—\$150.00," on the paper.

"Next we have rent. If we own the building we figure rent at a rate equal to what we would get if renting to others. If we are actually renting we simply put down the real rent figure—in this case we will suppose \$24.00 a month or \$300.00 for the year.

"Now comes the pay for help—salaries for helpers, proprietor, and each and every person assisting in the conduct of the business. Suppose then we figure on a helper at \$10.00 a week; an assistant at \$18.00 and the proprietor at \$25.00 a week. This," said the Editor, figuring, "will total \$2,240.00 for the year.

"After salaries we figure in depreciation on stock, tools, fixtures and everything that suffers loss from wear or age. This figure, by the way, is not great in the smith-shop, because of the very nature of the stock and equipment. So if we figure depreciation at two per cent on our investment we must put down \$50.00 in our column of figures.

"The next item to be figured into the cost of doing business is donations and contributions for one cause or another, subscriptions to newspapers and magazines, dues in business organizations and the like. For this, suppose we say \$50.00.

"Now come fixed expenses: taxes, insurance, water, light, fuel, and the like, which we will figure at \$200.00 for the year.

"After fixed expenses come the incidentals: such as postage, office stationery, telephone, advertising, canvassing, cigars and similar items. For incidentals we will say \$50.00.

"Then come losses—that is, bad accounts, goods stolen, work not charged for, allowances made to customers. Opposite losses we will put down \$200.00.

"Next we must figure in the cost of collections, attorney's fees or any extra expense connected with the cost of getting our money. If we are careful this figure will be low—if careless it will be high. For our example we will put down \$50.00.

"Now, if there are any other expenses connected with the business we must add

Investment — \$2,500

1-Int. on invest. - 6% ——— \$150.-
2-Rent @ \$24. ——— 300.-
3-Salaries - helper - 10.-
 asst. - 18.-
 Owner - 25.- } —2240.-
4-Depreciation - stock & tools — 50.-
5-Donations - subscriptions etc. 50.-
6-Fixed expenses - tax, water, etc. - 200.-
7-Incidental - postage, etc. etc. 50.-
8-Losses - goods stolen - bad acct. etc. 200.-
9-Cost of Collections ——— 50.-
\$3,290.00

Business \$5,000

5000 / 3290.00 = 65% or 66% cost of doing business.
Shoeing price \$1.75 shoes - 36
1.75 x .66 = \$1.15 steel - .03
1.15 + .48 = \$1.63 nails - .06
1.75 - 1.63 = 12¢ Cost - .03
12¢ = net profit. 78¢

THE EDITOR'S BUSINESS DEMONSTRATION

them—but the figures we have so far set down," said the Editor, totaling the column, "amount to \$3,290.00. Of course that sum is simply to illustrate the example. Now, Mr. Balfor, we have the total expenses for one year, and in actually figuring this out you must prove it by your books—you must see that your books actually show expense to this amount.

"Now, this figure showing expense is divided by the total amount of business done during the year. For instance, if we have done business amounting to \$5,000.00 we divide 3,290 by 5,000, and find that 66% is our cost of doing business. In other words it costs us 66 cents to do a dollar's worth of business.

"Now, suppose further, that our shoeing price is \$1.75. Four shoes equal about eight pounds, and at 4½ cents per pound we find that the shoes cost us 36 cents. The cost of doing \$1.75 worth of business is found by multiplying 66 cents by \$1.75. We find that our business cost is \$1.15. This added to our cost of materials, 36 cents for shoes; 3 cents for steel; 6 cents for nails and 3 cents for coal—which amounts to 48 cents—makes a total of \$1.63; the full cost. And if we get \$1.75 we make a profit of 12 cents.

"Now that is the idea and system, Mr. Balfor, but of course the actual figures are not the same for every business. The actual cost of shoeing a horse is pretty close to \$1.65, depending of course on the number of men employed and other expenses. Then, too, the various items of expense have been but roughly estimated; my main thought being to give you an idea of the method and not an example of actual figures."

"I think I understand it," put in Balfor when the Editor finished, "and I think, too, if smiths would figure costs that way there'd be mighty few who'd be doin' shoein' for twenty and forty. I'll tell y', Mr. Editor, this cost talk in our paper has got me t' thinkin' pretty hard along sum lines; an' folks down my way are due a good, big joltin' surprize or I don't know my name. I've worked up a pretty good business down there, but I ain't makin' what I oughta, an' now I know why. Well, I gotta get along," and with a hearty "thank-you" to the Editor, Jack Balfor went out.



Pounding On the Anvil

(Being the Poetic Fancies of a
Traveling Man)

As I journey o'er the country,
On my trips for cash and trade,
Through each village and each hamlet
Till each shop and shack I've made,
I discern the busy blacksmith,
Here in valley, there on hill,
And I note his cheery whistle
While he pounds on his anvil.

Before the shop, the crowded highway
Tells the salesman not to stop,
For he knows the smith is busy,
Has no time to talk of shop.
Clouds of sparks sweep o'er and round him,
But he stops not when he will;
Duty calls, naught else disturbs him,
When he bangs on his anvil.

He is deaf to all allurements
From the city, wood or stream.
Let the idle hunt for pleasure—
He's no time to play or dream.
Nail-keg orators yell and bluster
O'er the country's every ill;
But the good smith hears not, heeds not,
He just pounds on his anvil.

Gorgeous are the forest's colors,
Deep the azure of the sky,
Fleecy clouds like hosts of fairies
Dip and bow as they pass by;
But the blacksmith cannot see them,
Nature pleads with him until,
All her wonders, beauties wasted,
He heeds none but his anvil.

Thus I find the busy blacksmith
Pounding hard for future yield.
Planning, striving, toiling, sweating,
Growing with his growing field.
Looking always to the future,
When of work he's had his fill,
When he'll rest and leave to others
Pounding on the old anvil.

Ensay

Golden is the time of present,
Silver is the day to come,
Lead, the past—some best forgotten
In the rush that work be done.
So heed not the call of forest,
Lake or river, valley, hill,
But just heed the call of present—
Pound upon your own anvil.



Heats, Sparks, Welds

Good coal takes all of the "ire" out of fire.

Any man can go into business. Many have to go out. But how many retire?

System doesn't spell success. But system plus personality comes close to it.

Perseverance: A long word with a hard meaning that most people are afraid of.

Business is just what it means—the act of being busy—busy-ness.

Never mind the start or the smallness of the beginning—look to the finish. That's the important end.

Courtesy in business is an asset difficult to value. Discourtesy keeps profit from your pocket.

Who is running your business? Your helper, your competitor, your customers or yourself?

System may be likened to a searchlight. It shows what ought to be done, but it cannot do anything.

Conservation of energy is another modern phrase. It means the elimination of lost motion.

Tell your customer—"Don't leave the shoes on a horse longer than five or six weeks at the longest without re-setting."

Don't forget "Our Journal" when you have a picture taken of the shop. We are always glad to get good shop pictures.

Too much cannot be said on appearances. If a business is truly "the lengthened shadow of a man," what manner of man does your business appearance indicate?

No matter what little cog in the great wheel of life you are; no matter how small your part may be;—your work and your presence are needed.

The Pink Buffalo Stamps. Have you enough? We will supply you, free-of-charge. Show others that you are progressive—stamp yourself as a wideawake smith.

Every move for the better, every improvement, every good thing you do for yourself, is a boost for a better craft—a move for trade and business betterment.

"The windows are the eyes of the store," and the doors are usually the eyes of the shop. What do the eyes of your shop show? "A place for everything and everything in place?"

The world moves in answer to the natural laws of the Universe. Your business moves as a natural result of the laws of business system. Is your business moving—up or down?

What is your candid opinion of the work we are doing and the results so far showing in our work for better business methods in the craft; better equipment in the shop and greater skill at bench and forge? Let us have your ideas on these matters.

The Golden Rule in business is just as essential as the Golden Rule in life. Put yourself in your customer's place and try to treat him as he would like himself to be treated were conditions reversed. Cultivate your customer's point of view.

Good-will is one of the foremost assets of business. Your customer demands a certain make—you demand that certain brand from your jobber. Your customer knows that this brand makes good. This represents "good-will." Make every job a sample of your best work.

Endeavor to deliver a bit more satisfaction than the customer expects. It goes a long way toward clinching a customer's trade even in the face of price-competition. Service is the present-day watchword of successful big business. Make it your watchword and see your business grow.

The long-time customer is more valuable than the casual one-time customer. The standing of your shop may be largely determined by the number of regular patrons; which shows not only your established sources of gain but also the character of your shop. Therefore, make the transients regular customers.

The advertising pages, many folks say, are as interesting as the reading pages. Are you using any machine, tool, stock or item of equipment that is not advertised in our advertising section? If so, tell us about it and how you like it. We want to make this paper—"Our Journal"—a complete guide to the practical mechanic, the business man and the buyer in the smithing trade. Will you help us?

Fourteen years ago a man in Lafayette, Ind., was killed in a runaway accident, and his widow decreed that the horses should never again be taken from their stable. One of the animals died two years ago and a few days ago the humane society took charge of the other. The horse had not been shod in fourteen years and its hoofs had grown a foot long. Its legs were thin and it was nearly blind. Such cruelty is almost inconceivable.

Says one of "Our Folks" from the Keystone State—"The good work you are doing in 'Our Journal' deserves the support of every smith. Wouldn't it be a good idea for each present subscriber to get one new subscriber during this new year? That would show our appreciation better than anything else." How about it, Folks—are you with us on this? We'll do our part by giving you a full six-months credit on your own account for each new subscriber sent in. Tell your brother smiths.

The craftsman who keeps his eyes wide open at all times is surest to have a fat wallet and a good business. Keep on the lookout for new trade at all times. When a newcomer arrives in town, or in the neighborhood, don't wait for an introduction, introduce yourself—business is excuse enough—and if you go at it right, chances are you'll land a new customer. If you cannot do it personally, send your business card or a neat advertisement. But don't lose the chance offered.

Strange—some men seem to know more about their neighbor's shop than they do about their own. Tom Tardy, for instance, says: "Brown, down the street, has put in another machine—is it any wonder I can't compete with him. He can do so much more work now and do it at less cost, but he don't lower his prices." When asked why he did not put in machinery, Tom said: "I ain't makin' enough to buy any, an' I can't raise prices because my customers are kickin' now." And Tom returned to his work of patching his old bellows.



Our Honor Roll

That 1924 Class—Watch It Grow

Two more names jump up into the 1924 class. You see it's so easy. All you need do—if your subscription expires this month—is to send \$5.00 (\$7.00 in Canada or 1£ 14 sh. in other countries) and simply say long-time rates. We will give you ten full years' credit, mark your subscription paid up to February, 1924, and place your name right up among the leaders on the Honor Roll.

And then just think of the saving you make—the real, actual money you save—the time and the trouble and annoyance.

Just look over these rates and the savings and then make the saving you want to make. You can cut your subscription expenditure right in half without cutting down on the value received. Why not do it NOW?

U. S. and Mexico		Canada	Other Countries
2 yrs.....	\$1.60 save \$.40.....	2.00 save \$.50.....	10 sh. save 2 sh.
3 yrs.....	2.00 save 1.00.....	2.70 save 1.05.....	14 sh. save 4 sh.
4 yrs.....	2.50 save 1.50.....	3.20 save 1.80.....	18 sh. save 6 sh.
5 yrs.....	3.00 save 2.00.....	3.75 save 2.50.....	1£ save 10 sh.
10 yrs.....	5.00 save 5.00.....	7.00 save 5.50.....	1£ 14 sh. save 1£ 6 sh.

Send your order and remittance now—today. Don't wait until you forget all about it. You'll never regret it. Our subscription insurance saves you money. The sooner you begin saving the more you save. There is no time better than NOW.

NAME	Subscription Paid to	NAME	Subscription Paid to
W. C. WATT, Kan.	Dec., 1930	G. F. JOHNSON, Mich.	Feb., 1922
WADDINGTON FARM, W. Va.	Mar., 1928	R. H. KEITE, Iowa	Jan., 1922
I. J. STYER, N. J.	Jan., 1928	O. M. JOHNSON, Minn.	Oct., 1921
J. H. DAVIS, Cal.	Dec., 1924	H. FELDUS, Neb.	Sept., 1921
A. BOSCH, N. Y.	Mar., 1924	W. K. KLINE, Kan.	May, 1921
F. JACOBS, Ohio	Feb., 1924	P. NORRIS, Yukon Ty.	Jan., 1921
E. FOWLER, Ohio	Jan., 1924	J. L. JESTER, Mo.	Jan., 1921
M. LAMORFAUX, Ohio	Dec., 1923	T. P. CONSIDINE, Mass.	Dec., 1920
C. R. DAVIS, N. Y.	Dec., 1923	ED. GRIMM, Tex.	Mar., 1920
F. W. COPELAND, Me.	Dec., 1923	R. S. CHISLER, Ky.	Jan., 1920
J. L. TOMLIN, Kan.	Dec., 1923	P. REIF, Ohio	Dec., 1919
H. A. DAVIS, N. Y.	Dec., 1923	P. GUDMUNDSON, S. Dakota	Nov., 1919
E. H. TROYER, Ill.	Dec., 1923	R. RAMAGE, N. W. Terr.	Nov., 1919
J. BAILEY, Mar.	Dec., 1923	J. NAIMITE, N. Zealand	Nov., 1919
F. WATKINS, N. H.	Nov., 1923	F. UNDERWOOD, S. Africa	Aug., 1919
J. KOPFERS, Ala.	Nov., 1923	F. RASS, Sask.	June, 1919
W. B. ABELL, N. Y.	Oct., 1923	THEO. PASCHKE, Neb.	Apr., 1919
W. R. TURNER, Man.	Oct., 1923	I. M. TOWNSEND, Cal.	Apr., 1919
C. NELSON, Neb.	Sept., 1923	G. BISH, Fiji Islands	Apr., 1919
O. W. TAYLOR, Pa.	Aug., 1923	C. WILLIAMS, W. Aus.	Mar., 1919
CRAMP BROS., Tex.	Aug., 1923	R. TAYLOR, N. Zealand	Feb., 1919
L. C. LARSEN, Iowa	July, 1923	L. A. TIERING, Kans.	Jan., 1919
S. EYFENBAER, S. Africa	July, 1923	W. S. WAGNER, Tex.	Jan., 1919
G. L. DEWITT, Mont.	July, 1923	W. H. HARMER, Iowa	Dec., 1918
W. W. GREGG, Tex.	July, 1923	E. T. MARSHALL, Wis.	Dec., 1918
O. C. YOUNG, Mich.	June, 1923	F. HOOPENGARDNER, Md.	Dec., 1918
OTTO SPIEL, Penn.	June, 1923	H. BREW TECH, Inst. N. Y.	Dec., 1918
A. CRAPMAN, N. Y.	June, 1923	G. E. WINCHESTER, Cal.	Dec., 1918
C. BIRLEY, Md.	June, 1923	F. T. GRISHAM, Ark.	Dec., 1918
F. H. SHUPS, Penn.	June, 1923	H. SCHAFER, S. Dakota	Dec., 1918
J. C. STOVER, Penn.	Apr., 1923	D. MACDONALD, N. S. W.	Nov., 1918
W. SCHOONOVER, Penn.	Apr., 1923	C. A. RITCHIE, Scot.	Nov., 1918
J. B. RUNNIE, Iowa	Mar., 1923	T. E. SANDERS, Eng.	Nov., 1918
L. DOWNSDALE BROS., Mo.	Mar., 1923	G. E. HARDCASTLE, N. Y.	Nov., 1918
J. CARSWELL, Ark.	Mar., 1923	C. ZIEHL, Iowa	Nov., 1918
G. E. GLASIER, Ohio	Mar., 1923	CYCLONE GATE & FENCE CO., S. Africa	Oct., 1918
T. BRADLEY, N. S. Wales	Mar., 1923	W. ALBION, Minn.	Oct., 1918
G. FATH & Co., S. Africa	Mar., 1923	H. P. BOWENMAN, N. D.	Oct., 1918
I. T. NEREDHAM, Ill.	Feb., 1923	J. DELANE, Neb.	Oct., 1918
G. C. DIBINGER, Miss.	Feb., 1923	P. DEVERNER, Vict.	Oct., 1918
J. HUGHES, Ohio	Feb., 1923	H. C. HENDERSON, Queens.	Oct., 1918
J. WIENER, Minn.	Jan., 1923	J. ELEY & SONS, S. Aus.	Oct., 1918
Z. A. EWOS, Kan.	Jan., 1923	J. E. MATTHEWS, Eng.	Oct., 1918
W. G. WISS, Cal.	Jan., 1923	MUNRO & Co., N. Z.	Oct., 1918
F. S. BISHOP, S. Africa	Jan., 1923	D. R. WINTON, N. S. W.	Oct., 1918
S. P. HARNET, Mont.	Dec., 1922	J. SCHRAPEL, S. Aus.	Oct., 1918
W. BRECKNER, Okla.	Dec., 1922	V. WILKINSON, Queens.	Sept., 1918
J. PABIAN, Neb.	Dec., 1922	GRIMLEY, Ltd., N. S. W.	Sept., 1918
F. FREDERICKSON, Iowa	Nov., 1922	C. E. BIRLEY, Md.	Sept., 1918
W. O. LEURS, Ill.	Nov., 1922	J. F. BAGGETT, Queens.	Sept., 1918
W. LAWSON, N. Z.	Nov., 1922	J. THORNECROFT, N. W. Terr.	Sept., 1918
W. H. MILLER, Iowa	Oct., 1922	W. A. THUGE, Queens.	Sept., 1918
O. A. MARTIN, Idaho	Sept., 1922	A. L. V. BRIS, S. Africa	Sept., 1918
H. V. WYATT, Wash.	Sept., 1922	GEO. A. PETTY, Utah	Sept., 1918
J. N. SKOW, Iowa	Sept., 1922	G. W. HAZLER, Pa.	Sept., 1918
A. D. STANDFORD, Wash.	Sept., 1922	C. WALTER, Ore.	Sept., 1918
T. TEMKIEWICZ, Que.	Sept., 1922	T. B. HOLZ, Okla.	Sept., 1918
W. D. VALENTINE, Iowa	Aug., 1922	ROBERT COOK, Ky.	Sept., 1918
G. HORMAN, N. Y.	July, 1922	A. B. WENDLANDT, Wash.	Sept., 1918
J. ERMAN, Ark.	July, 1922	A. J. BROCKMAN & Co., Vic.	Sept., 1918
W. K. W. HANSEN, Pa.	June, 1922	PETER COCKS, W. Aus.	Sept., 1918
ROBERT TOCHTER, Cal.	June, 1922	R. J. TOMPKINS, Texas	Sept., 1918
J. VAN MARTER, N. Y.	June, 1922	J. VASCHETTI, Colo.	Aug., 1918
E. ANDERS & SON, S. Aus.	May, 1922	E. C. FUXTON, So. Aus.	Aug., 1918
LOUISA CARLAGE WKS., Va.	May, 1922	L. SMITH, B. C.	Aug., 1918
S. SMITH, Tex.	Apr., 1922	V. SMITH, Cal.	Aug., 1918
J. W. H. LA, La.	Mar., 1922	W. CRIBB, Queensland	Aug., 1918
E. A. DILLON, Nev.	Mar., 1922	GEO. REID, S. Africa	Aug., 1918
D. W. SMITH, R. I.	Mar., 1922	H. KELENBERG, N. J.	Aug., 1918
D. F. KUTTER, Wash.	Mar., 1922		

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W. D. BRADFORD, Cal.	Aug., 1918	R. ROSS, N. S. Wales	Sept., 1917
A. DISCHER, Aus.	Aug., 1918	I. E. SPROUD, Mex.	Sept., 1917
T. H. GRAHAM, Vict.	July, 1918	FRED. BLOHM, Tex.	Sept., 1917
GILBERT BROS., S. Aus.	July, 1918	R. E. MASTON, Va.	Aug., 1917
A. MACKENZIE, W. Aus.	July, 1918	C. T. WOOD, Kans.	Aug., 1917
GEO. DASE, N. Zealand	July, 1918	GEO. B. HEATON, N. J.	Aug., 1917
C. R. OLIVER, S. Africa	July, 1918	CLARK & FAUSSET, Queens	Aug., 1917
L. G. REID, S. Africa	July, 1918	C. I. HOCKETT, Cal.	Aug., 1917
W. M. PURYEAR, Ala.	June, 1918	H. C. STENNETT, Tex.	Aug., 1917
THOM & VERSTER, S. Africa	June, 1918	M. DJAGER, S. Africa	Aug., 1917
L. LACASTE, Que.	June, 1918	F. HOWARD, Kan.	Aug., 1917
WRIGHT & SON, Texas	June, 1918	H. FERREL, Ill.	Aug., 1917
ALBERT MELLUM, N. D.	June, 1918	J. MCMEKEN, N. Z.	Aug., 1917
J. LINDSAY, S. Africa	June, 1918	F. H. GIERKE, S. Aus.	Aug., 1917
J. H. GIBB, S. Africa	June, 1918	A. L. PITTINGER, Ill.	Aug., 1917
W. W. BRIDGES, Ark.	June, 1918	F. SPINKS, England	July, 1917
MATHESON BROS., Iowa	May, 1918	J. P. KELLY, Md.	July, 1917
ED. HOLLAND, Queens	May, 1918	F. G. STONE, S. Africa	July, 1917
H. L. HASWELL, N. C.	May, 1918	H. J. DEVONSHIRE, N. Z.	July, 1917
CHRISTENSEN BROS., Cal.	May, 1918	V. J. HUBBARD, N. Y.	July, 1917
Q. F. BRACKETT, Wash.	Apr., 1918	J. C. SKINNER, Vict.	July, 1917
E. KOPPE, Wis.	Apr., 1918	A. FASSNACHT, Tenn.	June, 1917
J. H. MARTIN MFG. CO., Ind.	Apr., 1918	H. A. CHEEVER, N. H.	June, 1917
H. S. WAYNE, S. Aus.	Apr., 1918	D. SHAFER, N. Y.	June, 1917
H. S. YONGUE, Wash.	Apr., 1918	W. R. GILLING, S. Africa	June, 1917
W. WELLSAUSEN, N. D.	Apr., 1918	J. H. BAKENBERG, S. Africa	June, 1917
W. H. CHIPMAN, Mo.	Apr., 1918	F. C. HALLENBERG, N. Y.	June, 1917
A. P. STROBEL, N. Y.	Apr., 1918	F. C. BOCK, Neb.	June, 1917
E. H. ALBERTY, Pa.	Apr., 1918	W. PRATT, Iowa	June, 1917
J. R. JEFFRIES, Pa.	Apr., 1918	C. A. STEBBINS, Kan.	May, 1917
R. COLVIN, Ind.	Apr., 1918	W. S. SULLIVAN, La.	May, 1917
J. LIPPERT, Ill.	Apr., 1918	H. SMITH, Queensland	May, 1917
OTTO TIER, S. Africa	Apr., 1918	P. VANDERHAEGHEN, Mich.	May, 1917
FLA. AG. & MACH. CO.	Mar., 1918	YOST & HALVORSON, Minn.	May, 1917
J. V. FINE, Ill.	Mar., 1918	W. MCCOY, Kan.	May, 1917
H. J. FISHER, Mich.	Mar., 1918	A. GUTTLER, Tex.	May, 1917
GEO. SMITH, N. Z.	Mar., 1918	C. F. J. LORENZ, N. Y.	May, 1917
AUG. HOLNAGEL, Ore.	Mar., 1918	A. DATWYLER, Ohio	May, 1917
A. C. UHMLING, Wis.	Mar., 1918	E. T. HOGMAN, Conn.	Apr., 1917
J. C. YOUNG, Pa.	Mar., 1918	O. F. MATSON, Utah	Apr., 1917
D. C. HOUCK, Ohio	Mar., 1918	F. PETTIT, Okla.	Apr., 1917
JOHN EYER, Neb.	Mar., 1918	H. G. MARRIOTT, Utah	Apr., 1917
J. S. STAPLES, Ohio	Feb., 1918	E. THIRAUDRAU, Wis.	Apr., 1917
S. J. BOYD, Idaho	Feb., 1918	W. PICKERING, S. Africa	Apr., 1917
J. MOLITOR, Ill.	Feb., 1918	ED. BURROWS, England	Apr., 1917
F. P. FELLOWS, N. Y.	Feb., 1918	L. KAUSCH, Wis.	Apr., 1917
J. W. STRADMAN, Ohio	Feb., 1918	J. M. BROWN, Tex.	Apr., 1917
W. H. GATTAFFI, Penn.	Feb., 1918	P. PFIFFER, Ore.	Mar., 1917
E. N. GATES, Vic.	Feb., 1918	W. WATSON, Vic.	Mar., 1917
RENTON WAGON WKS., Wash.	Feb., 1918	W. BAGLEY, Mass.	Mar., 1917
WHITING FDR. EQUIP. CO., Ill.	Feb., 1918	B. E. CAMPBELL, Mass.	Mar., 1917
J. P. KOENIGS, S. Dak.	Feb., 1918	R. RUFFER, Ill.	Mar., 1917
RICHARD BRENNER, Tex.	Feb., 1918	G. SPANKE, Wis.	Mar., 1917
W. F. HILL, N. C.	Feb., 1918	W. H. MILLER, Mo.	Mar., 1917
O. O. GODERSTAD, Wis.	Feb., 1918	J. C. WOODS, W. Aus.	Mar., 1917
M. C. BETTIS, Tex.	Jan., 1918	C. BOULTON, N. S. Wales	Mar., 1917
P. SHERRMIM, Cal.	Jan., 1918	C. A. HAWKINS, Ore.	Mar., 1917
W. B. BETTEL, Me.	Jan., 1918	A. L. MONTGOMERY, W. Va.	Mar., 1917
W. MISCALE, Queen, Aus.	Jan., 1918	J. PETERSON, Ia.	Mar., 1917
S. PORTBLANCE, Que.	Jan., 1918	J. ANDERSON, Tas.	Mar., 1917
D. C. FOLEY, Cal.	Jan., 1918	A. J. NEILL, Va.	Mar., 1917
GLEASON BROS., La.	Jan., 1918	ED. DEITRICH, Ind.	Mar., 1917
C. E. KRUG, Wis.	Jan., 1918	LEWIS CHASE, N. Y.	Mar., 1917
G. E. WOODARD, Kan.	Jan., 1918	E. O. LEE, S. Dak.	Mar., 1917
F. J. DALLY, W. Aus.	Jan., 1918	S. STEMPLE, Ohio	Mar., 1917
J. MORROW, Pa.	Jan., 1918	R. S. GUGIBERG, Kan.	Mar., 1917
G. M. SHYMOUR, Ill.	Dec., 1917	J. S. HASKELL, Col.	Mar., 1917
J. TEMPLETON, Scotland	Dec., 1917	W. L. ROARK, Tex.	Mar., 1917
F. PROCTER, Tas.	Dec., 1917	A. R. BARLOW, Tex.	Mar., 1917
F. E. EOLERS, Ohio	Dec., 1917	C. A. WHITACRE, Ohio	Mar., 1917
C. T. FORREST, Cal.	Dec., 1917	B. P. CARNET, Ill.	Mar., 1917
THEO. BUSH, N. Y.	Dec., 1917	C. STOCK, N. Z.	Mar., 1917
J. T. ELLIOTT, Ill.	Dec., 1917	T. J. DORRY, Conn.	Feb., 1917
W. VOELPEL, Me.	Dec., 1917	F. MARSH, Mich.	Feb., 1917
J. G. LAUER & SONS, Mo.	Dec., 1917	J. H. WHITE, N. H.	Feb., 1917
MESS BROS., Victoria	Dec., 1917	McGOWAN BROS., N. Y.	Feb., 1917
E. BLOOMER, Aus.	Dec., 1917	J. W. HAUGHT, Ill.	Feb., 1917
H. P. ADAMSON, N. Zealand	Dec., 1917	IRVING BROS., N. Y.	Feb., 1917
G. E. RAYME, N. Y.	Dec., 1917	W. H. SCHREIBER, Neb.	Feb., 1917
G. E. BARTELL, Wash.	Nov., 1917	A. J. H. WEGENER, S. Africa	Feb., 1917
F. FROELICH, Tex.	Nov., 1917	H. SCHNETTE, Ill.	Feb., 1917
J. A. SHEPARD, N. Y.	Nov., 1917	E. DOUGHAMAN, Ohio	Feb., 1917
McMILLAN, HEAD & CO. S. Africa	Nov., 1917	CHAS. F. GIESE, N. Mex.	Feb., 1917
C. ANDERSEN, Queens	Nov., 1917	M. E. GOLLE, Pa.	Feb., 1917
J. KILGOUR, Scotland	Nov., 1917	J. POTTHOFF, Neb.	Feb., 1917
F. R. TOMLINSON, Kan.	Nov., 1917	C. M. GARETT, Mich.	Feb., 1917
KATE & AINLEY, Eng.	Nov., 1917	ERNEST FINLEY, Pa.	Feb., 1917
T. H. ZINGEL, Wis.	Nov., 1917	A. TILLMAN, Cal.	Feb., 1917
SCHOLLER BROS., Ind.	Nov., 1917	WALKER BROS., N. Z.	Feb., 1917
E. M. WURSTER, Mich.	Nov., 1917	G. W. WHITTINGTON, W. Va.	Feb., 1917
S. Z. FREY, Ind.	Nov., 1917	J. H. HOYLE, S. Africa	Feb., 1917
B. A. STEINKE, Ohio	Nov., 1917	F. ROSCHY, Pa.	Feb., 1917
J. N. BATHGATE, N. Dak.	Nov., 1917	AUGUST MILLET, Ill.	Feb., 1917
W. H. HOUGHTON, Pa.	Nov., 1917	C. P. ROBERTSON, S. Africa	Feb., 1917
G. W. BOOZE, La.	Oct., 1917	P. Y. MILLER, Miss.	Feb., 1917
C. R. WALTERS, Ill.	Oct., 1917	C. A. CHRONISTER, Pa.	Jan., 1917
S. SMITH, S. Aus.	Oct., 1917	CHAS. KIEFER, Pa.	Jan., 1917
W. STEPHEN, Queens	Oct., 1917	F. S. ROBBINS, Ohio	Jan., 1917
W. T. CUTKOMP, Iowa	Oct., 1917	A. A. DRAN, Mass.	Jan., 1917
GEO. PORSCHKE, Mo.	Oct., 1917	H. W. RINEHART, Ohio	Jan., 1917
J. W. RAPP, N. Y.	Oct., 1917	M. J. ENGELBRECHT, Mo.	Jan., 1917
W. C. RONEY, Pa.	Oct., 1917	J. J. McBAIN, Idaho	Jan., 1917
J. N. MILES, Ky.	Oct., 1917	J. A. MELLOTT, Pa.	Jan., 1917
C. L. THOMPSON & SON, N. D.	Oct., 1917	TORKILDSON BROS., S. D.	Jan., 1917
EMIL PLATZ, N. D.	Sept., 1917	O. DANNEMAN, Minn.	Jan., 1917
F. STAU, Ohio	Sept., 1917	S. HETEM, S. Africa	Jan., 1917
E. LARSON, Minn.	Sept., 1917	G. A. GURLEY, Ore.	Jan., 1917
H. SCHOONOVER, N. Y.	Sept., 1917	F. K. WADE, Me.	Jan., 1917
PERFECTION SPRING CO., O.	Sept., 1917	L. V. SENN, Neb.	Jan., 1917
W. A. WILSON, N. Z.	Sept., 1917	S. H. AUSTIN, N. Y.	Jan., 1917
		H. KAH, Ia.	Jan., 1917
		J. H. BERGEN, Kan.	Jan., 1917
		F. G. A. WILLIAMS, S. Aus.	Jan., 1917



What Your Trade Paper Does

ELBERT HUBBARD

The heir-apparent to the British throne has for his crest three ostrich plumes. And on an intertwining scroll is the motto, "Ich Dien." Which being interpreted means, "I serve."

The heir apparent to the American sovereign has for his coat-of-arms, three baseball bats, rampant, on a field of emerald. And underneath are the words, "Ischi Beble"—"I should worry!"

Both sentiments express two vital principles; work and play, service and recreation.

And this combination, broadly speaking, meet life's contingencies, and is full of possibilities.

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Your Trade Paper has justified its existence by its usefulness—its service. Its possibilities depend upon your loyalty and co-operation.

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Preventing and Removing Rust

There are many times when stock becomes unfit for use because of the coating of rust. A good preventive for rust on steel is to dissolve 16 parts turpentine and 1 part caoutchouc (chemically pure rubber, obtained from druggists) by a gentle heat. Add to this, 8 parts boiled oil, stir and bring to the boiling point. Apply with a brush. The coating can be removed, if desired, by turpentine. Another good recipe is to melt 1 ounce of resin in a gill of linseed oil and, while hot, mix with it 2 quarts of kerosene.

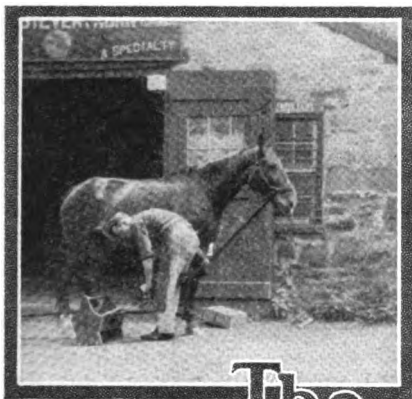


This can be kept ready to apply at any time with a brush or rag.

Rust may be removed from iron by immersing the piece for several days in water to which a little sulphuric acid has been added. Powdered alum in strong vinegar, oil of tartar, or fine emery, is also excellent for removing rust from iron and steel. Kerosene or turpentine, if left on the stained or rusted portions over night, will sufficiently soften the rust so that it may be removed by the use of fine emery cloth followed by a polishing powder. Old rust may be removed in some cases by rubbing with a paste consisting of equal parts of fine tripoli and flowers of sulphur thoroughly mixed with olive oil.

Rust spots on nickel can be treated with grease, and after several days rubbed with a rag saturated with a few drops of hydrochloric (or muriatic) acid in ammonia. Parts should then be thoroughly rinsed, dried and polished.

"An ounce of prevention is worth a pound of cure," but the cure comes in mighty handy, sometimes.



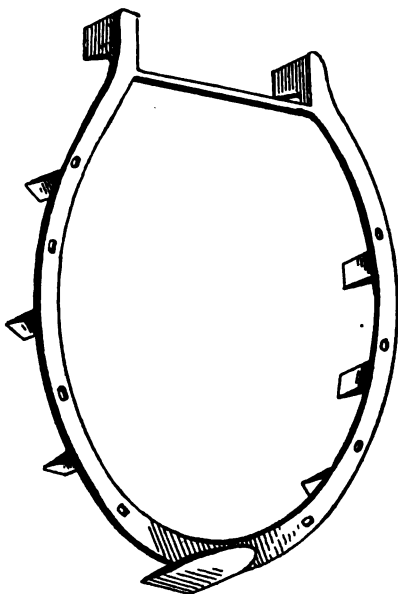
The Horseshoer

Footwear of the Racing Stars of 1913

The accompanying pictures show some of the shoes worn by the horses most in the public eye during the season of 1913. They were recently shown by James Clark in *The Horse World*. "The Russian ice shoe," says Mr. Clark. "is for a hind foot, and the calks are forged out of the one piece of steel; the only weld used is where the bar is put in."

The Value of a Horseshoe

A better illustration of the value of a horseshoe, or its relation to the



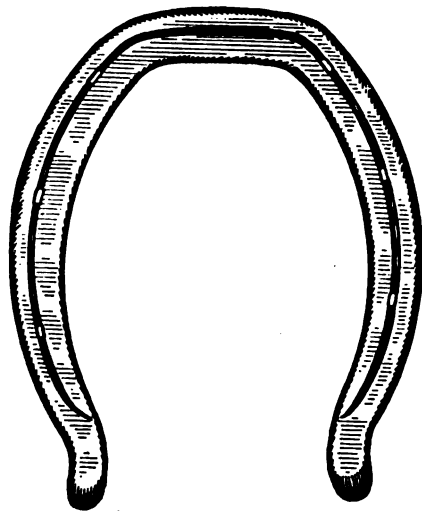
AN ICE SHOE USED IN RUSSIA

success or failure of a valuable racehorse, could hardly be asked for than was given at the Kalamazoo track on the closing day of the recent successful meeting there. Mr. Geers was driving Anvil in the free-for-all trot, and in turning to score for the word Anvil caught one of his front shoes and pulled it off, Mr. Geers not noticing what had happened until he was almost at the wire where Anvil commenced to rock and roll, showing that he was out of balance. It was too late to take him back. Geers shook his head, but the starting judge did not understand the situation and gave the word "go." Anvil could not trot without that one shoe, made a few breaks and was distanced. Dudie Archdale might possibly have won the race just the same had Anvil not met with this mishap, but Anvil with that other seven ounces of steel and leather on would have made her go considerably faster to win; he would have been spared the odium of "dis" in front of his name in the summary of the race, and it is possible that the thousands of dollars that were wagered on the result of the race might have gone in a different direction. Anyway, that shoe and pad lying in the stretch looked to me to be worth several thousand dollars to the stable and its followers when I saw Anvil far back of the flag and on a run.

It is not to be wondered at, therefore, that the wizards of the sulky pay specific attention to the manner in which their racers are shod. Tenara, the biggest money-winning

trotter of the year, has two different sets of shoes. One set she wears between her races and the other set she wears in her contests for money and glory. Her front racing shoes weigh only $5\frac{1}{2}$ ounces each, and her hind shoes—which are swedged—weigh but 3 ounces. Underneath her front shoe is a 2-ounce rubber pad, making the total weight of the great trotter's footwear—when she is in action—only 21 ounces on all four feet. Her jogging shoes weigh only 2 ounces more to each shoe and are of the same pattern (swedged) as the lighter set. Tenara's front toes measure $3\frac{5}{8}$ inches and the angle of her foot is 47 degrees. The toe of her hind shoe is squared and there are none of the customary heel calks on her shoes behind. The length of her hind toe is $3\frac{1}{2}$ inches and the angle is 52 degrees.

Etawah, 2.07 $\frac{1}{2}$, the greatest three-year-old trotter in Mr. Geers' stable, is shod in the simplest and plainest possible way. The "frill" on Etawah's shoes being a groove across the toe of all four of them, and the front shoes are slightly beveled at the toe. In front of the groove or corrugation a light rim of leather under the shoe completes his front equipment so far as his footwear is concerned. Behind, Etawah wears a 4-ounce shoe with a low block heel, and the outside heel of his hind shoe is scarcely a quarter of an inch longer than the inside. His toes are about as short as they can be made—perhaps $3\frac{1}{2}$ inches—and Fred Cope (Geer's shoer) tells me that the angle is about 48 in front and 52 behind, although he has

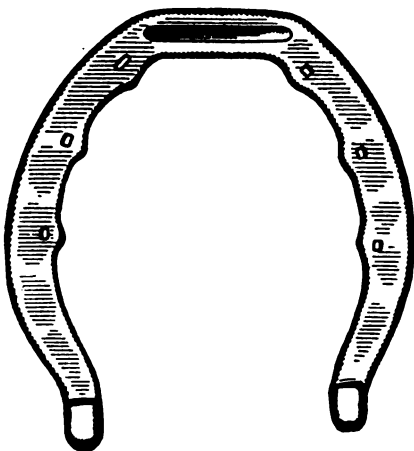


HIND SHOE WORN BY TENARA, 2.05 $\frac{3}{4}$



never thought it necessary to use a foot-adjuster on him; as all he needs is "ironing off."

Peter Volo (2), 2.04 $\frac{1}{4}$, the new world's champion two-year-old trotting stallion, is also shod in a very plain and simple manner. Hughie Ross, the "Little Giant" who has been connected with the Murphy stable for several years, shod Peter at Detroit and let me take a peek at a pair of his front shoes that he had worn since last spring, an engraving of one of which is shown, this being the shoe worn by him when he raced at Kalamazoo. Peter's front shoe weighs 8 $\frac{1}{2}$ ounces and is about as heavy in the bar as it is in any other portion, so that the weight is distributed equally over the bottom of the foot. A set of "jar" calk is brazed on each heel, and the outside portion of the shoe is rolled off. When Peter's new shoes were put on, Hughie made them look second-hand; that is he made them as much like the old ones as he could, only making them a trifle heavier, the old ones having become too light. Peter also carries a rim pad under his shoe; in fact there are very few horses racing or in training that do not wear some kind of pad. Peter's front toe is 3 $\frac{3}{4}$ inches long and he stands in front at an angle of 49 degrees—



HIND SHOE WORN BY
ETAWAH (3), 2.07 $\frac{1}{4}$

just right. He wears a 4-ounce swedged shoe behind, almost a facsimile of Tenara's hind shoe, his toe behind measuring 3 $\frac{5}{8}$ inches, and his angle is 53 degrees.

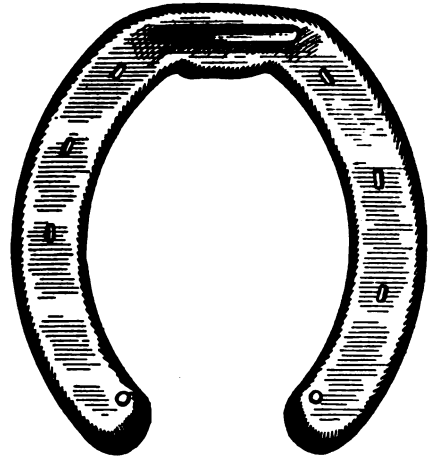
Leata J., 2.03, the fastest green pacing mare that ever started, wears a bar shoe with a scoop or "spoon" toe; the shoe weighs 6 $\frac{1}{2}$ ounces

and her front toe measures 3 $\frac{11}{16}$ inches, her angle in front being 48 degrees. Leata's hind shoes are of the cross-fire variety, swedged on the outside and half round on the inside. They weigh 4 $\frac{1}{2}$ ounces. She carries a 3 $\frac{3}{8}$ -inch shoe behind, with an angle of 52. Mr. S. S. Bailey, the wealthy Californian who owns Leata J. and is racing a stable for the first time in his career on the Grand Circuit, looks personally after the details of his stable, and not the least of these is the shoeing.

Two years ago the 17th of last October, Harry Stinson, the famous colt-trainer of Lexington, Ky., bought Don Chenault (3), 2.05 $\frac{3}{4}$, for one of his patrons before he had worn a shoe and hardly anything more than a halter. The man whose name is connected with those brilliant young trotters, Sadie Mac, 2.06 $\frac{1}{2}$, Kentucky Todd (3), 2.08 $\frac{3}{4}$, and many others of national reputation, put the seal of his approval on the son of Peter O'Donna when he saw him trot through a pasture. There were very few, if any, of the Kentucky trainers and expert critics on horse matters that shared the opinion expressed by Stinson that he would "eventually make of him the fastest colt he ever trained," although they have a very high regard for his ability as a developer of speed and as a race driver. When Stinson began on Don he looked and acted like anything but a good prospect for racing honors, and the amount of sympathy expressed for the owner and trainer of the colt could scarcely be equaled at a good man's funeral. When Harry finally got him to strike a square trot he was carrying 19 ounces on each front foot; that was early in the spring of his two-year-old form. Gradually Don began to improve, and as the improvement continued Stinson regularly reduced the weight he was carrying in front, so that in the fall of his two-year-old form he was carrying only 12 $\frac{1}{2}$ ounces on each front foot. To illustrate vividly the improvement made by judicious training and reducing the weight, without making a radical change, it may be said that Don Chenault worked a mile in 2.12 in October, almost a year to a day from the time that Stinson took him from the pasture "as green as a gourd."

Mr. Stinson shod Don with a rubber racing pad under his front

shoes; he was a colt that required a lot of hard, regular work; the pad was a valuable adjunct to his footwear, as it prevented concussion and added a certain amount of weight that was not dead weight and was distributed over the bottom of the foot. When Don Chenault was started up last spring he carried the



FRONT SHOE WORN BY
ETAWAH (3), 2.07 $\frac{1}{4}$

same weight in front that he wore the fall before. Stinson trained him differently from any horse or colt he ever trained, for the reason, as he says, "there never was one just like him." He never gave him any brush work; always miles, miles, then a few more miles.

The engravings shown were made from the shoes he wore at Columbus and Lexington which were removed the day before he was shipped to Austria at the close of the Lexington meeting. The total weight of the front shoe, rubber pad and the sponge placed under it, was 8 $\frac{3}{4}$ ounces; the front shoe had sharp-set calks at the heels and a clip at the toe to prevent it being driven back; the hole at the toe of the shoe is where the pad was riveted on to prevent it "creeping" from under the toe of the shoe. His hind shoes weighed 2 $\frac{3}{4}$ ounces each and were of the swedged variety, although those shown here were worn very thin on the outside. Don Chenault's toes were all the same length, 3 $\frac{3}{4}$ inches; the angle of his front feet was 50 degrees and of the hind feet, 55 degrees.

I have seen a great many little peculiarities in the gaits of fast—and slow—trotters and pacers, and I dare say I have hung around the homestretch and watched as many

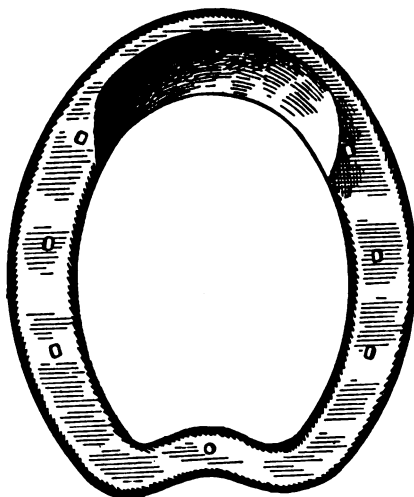


racehorses—perhaps more—than any one man, with the object in view of noting their methods of locomotion, and if they had any defect in their gait try to figure out its cause and a remedy for it; but I never saw one, young or old, gaited just like Don Chenault is in front. When he is going at his highest flight of speed, his front foot instead of being extended or unfolded with the forward movement of the leg is curled under or back until just the instant before he lands when he straightens it out with a snap. Watching him closely you are inclined to think he is going to land on the point of his toe, and that he will surely knuckle over, but Harry told me recently that he never did this in front, although he would occasionally knuckle behind when loafing along. The history of Don Chenault, brief as it is, is an object lesson; it was necessary to put on weight to teach him to trot; when he had learned to do that it was just as necessary to take off some of that weight and do so in such a way that the change would not be noticeable. It was necessary to use the rubber pad and sponge under it to prevent concussion, for he was a colt that required a lot of severe work to get his best efforts. The history of Don Chenault differs materially from the history of other great three-year-olds and is, I think, a striking illustration of the absolute necessity of intelligent methods in shoeing as well as training in order to secure the best results. Don got all of his work at the Lexington track, and Jim Monahan, long identified with the historic old racecourse as a skilled shoer, adjusted the great colt's footwear from the beginning to the close of his career in America.

A comparison of the shoes worn by the great trotters and pacers of the year is at all times a fascinating study. It does not seem reasonable that an ounce or two should make any appreciable difference in a horse's gait. It is hard for the uninformed to believe that a trotter capable of winning a heat in 2.10 with an 11-ounce shoe on each front foot could not trot fast enough to beat an ordinary road horse if the weight of his shoes were reduced to six ounces each. On the other hand, if the weight of each front shoe were increased four or five ounces the re-

sult would be disastrous. That is where the scientific part of the shoeing and balancing of harness horses comes in.

There are lots of good mechanics who can make most anything out of a piece of steel or iron, but when they come face to face, so to speak, with the proposition of shoeing a trotter according to some other per-

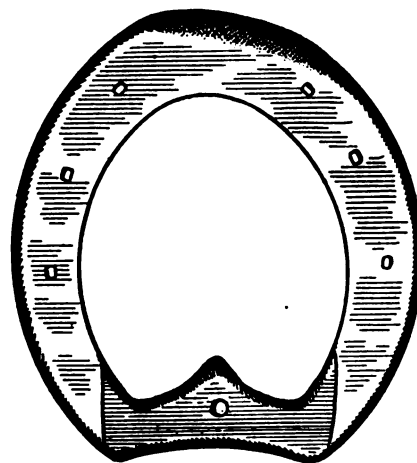


BAR, SCOOP TOE SHOE WORN IN FRONT BY LEATA J., 2.03

son's idea they are always ready to sidestep by holding the owner of the horse, an argument which usually prevails, or the owner gets disgusted and trades the horse for a family cow. It is just as necessary for a man who is going to follow the business of shoeing racehorses to go to school as it is if he were going to take up some line of work that required a good business education. The school to which he should go is the training camps of the horsemen who make a study of these things and with the assistance of an expert shoer work out their ideas to a final conclusion. By the time the "student" has absorbed a few chapters of Lon McDonald's theories, backed up with Jake Councilman's "That's right," he would no doubt begin to think that all he needed to complete his education in scientific locomotion would be to follow Lon and Jake over to Cole's horseshoe factory and witness the actual carrying out of the idea. If, however, the man who shoes nearly all of the horses in Indiana, besides doing a large mail order business in new and repaired horseshoes, should see matters in a different light and show them that they were making the most serious mistake ever made in

shoeing a trotter, the "student" would probably go home that day after school was out, knowing perhaps less than he did in the morning.

There is only one method to pursue to accomplish anything worth while in this horseshoeing game, and that is to go to work at it with the same determination to master it that you would put into any other calling. It is just as necessary to know the relation of weight to action and just where to apply it to get results as it is necessary for a physician to know the effect of a certain medicine on his patient. A man may be capable of making a nice horseshoe of a certain style, but if he does not know just the kind of a horse that requires that style of shoe his ability avails him but little. Of course he may hit it once in a while; so might a marksman standing in the open and shooting promiscuously into the woods bring down a bird occasionally, but he would not be able to explain intelligently just how it happened. There is one fact that I have always tried to impress on my patient readers, and that is the importance of protecting a horse's foot in such a manner that all shock and concussion is reduced to a minimum. An extra ounce or two in a shoe may mean a great deal, but put the same



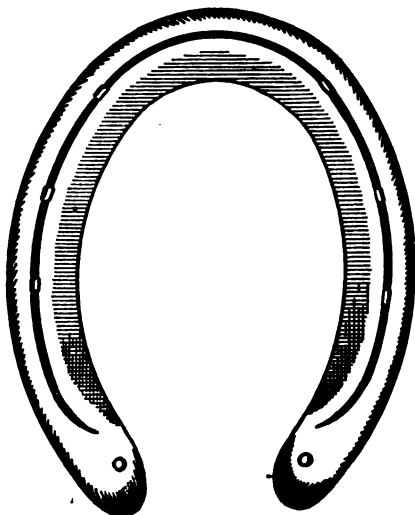
FRONT SHOE WORN BY PETER VOLO (2), 2.04½

extra weight on the same horse in the shape of a pad and it will have a beneficial effect nine times out of every ten. It is utterly impossible to get a horse's best efforts when there is foot trouble to contend with. Of course he will go out and do the best he can; that's his nature, and



you will say "he did remarkably well considering his condition"; but how about improving his condition?

There is many a horse suffering night and day, 24 hours out of the 24, and the owner, driver, groom and shoer do not know it. It requires but a small amount of neglect to cause a horse's heel to begin to contract; it takes but a slight contraction of the heel to interfere with the articulation of the lateral cartilages, thereby creating a slight inflammation that poulticing and soaking relieve temporarily, but the cause of the irritation is still there, and if the wall of the foot is thick and heavy that makes matters worse; for a wall of that nature is unyielding. And so matters go on from a seemingly trivial soreness to a shortened stride, and finally comes the acute lameness. The sunken eyes



HIND SHOE WORN BY LEATA J., 2.03

tell all of the misery and suffering that a little enlightenment, a little study of the horse's foot and leg, would have prevented.

What do I mean by a little study of the horse's foot and leg? I'll tell you what I mean in a few plain words. When you see a horse with a big, strong shin and pastern bone and a small, narrow foot with the cartilages forced up above the edge of the wall, ordinary intelligence will tell you that the bones of the foot and the bones of the leg must correspond as to size, and if the large bones are encased in a small, contracted wall of horn you should know at a glance why that horse is lame or at least goes "peggy" just like one of those Pittsburgh coons that wears a number six shoe on a number nine

foot with a hobble skirt thrown in to make the gait unchangeable.

Often a slight injury to a colt's foot cause him to put all of his weight on the other one, thereby permitting the injured one to contract slightly, and perhaps through a little neglect it is allowed to contract more and more. The growth is in a measure retarded, and when the colt reaches maturity he is possessed of one foot suited for a two-year-old and another that will answer all right for the purpose for which it was intended; but it would work much smoother if it had a mate.

I know of no greater handicap to a racehorse than a brace of misfits hung on the end of its legs. Of course we'll have lame horses and lame men and lame excuses until the end of time, but a lot of this foot and leg trouble can be avoided if we will take action as soon as the first symptoms appear. Proper shoeing, springs, pads and a course of blistering will often ward off what may develop into something serious if preventive methods are not adopted. The shoeing end of the racing business is receiving a great deal more attention than in former years, but the study of the question is confined to a comparatively few trainers, owners and shoers. There should be, and I believe there will be in the coming years, a more extensive study of this all-important question. Let us hope so, anyway.

Jim McFadden's "Si-an-tiffick Harseshoein"

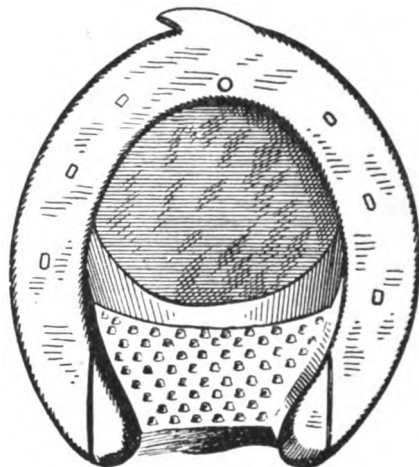
JAMES CLARK
in *The Horse World*

A good many years ago there lived in the southern part of New York State an old son of the Emerald Isle who had spent the best years of his life in the pleasant occupation of shoeing horses and drinking "tangle-foot," and delivering extemporaneous lectures on "si-an-tiffick harseshoein"; he was a good mechanic, too; his ideas were wholly original, and he had the ability to execute any piece of work that came to him with neatness and dispatch. When us kids had an opportunity to run out on our boss we'd go around to Jim McFadden's little smokehouse of a blacksmith shop, light him up with a little "dinamite"—two drinks of which would make a rabbit spit

in a bulldog's eye. His name wasn't McFadden, but there were so many days and weeks in his existence that he didn't really know what his name was that he probably will not care if I "ring" him, now that he's dead and sleeping peacefully in his little sunless palace of rest.

I remember one day in particular Jim was in good form, and standing on the floor was a pair of long-legged, cat-hammed farm horses, poor and weak, and excusable for trying to batter their ankles into pulp at every step. They were both bad interferers, and Jim was the only man in that section who could shoe them so that they would go clear.

"How do you do it, Jim? tell us. We won't tell anyone about it," we coaxed, knowing very well that if we didn't get the story before he had crooked his elbow a few more times



THE PAD AND SHOE WORN BY
DON CHENAULT (3), 2.05 1/4

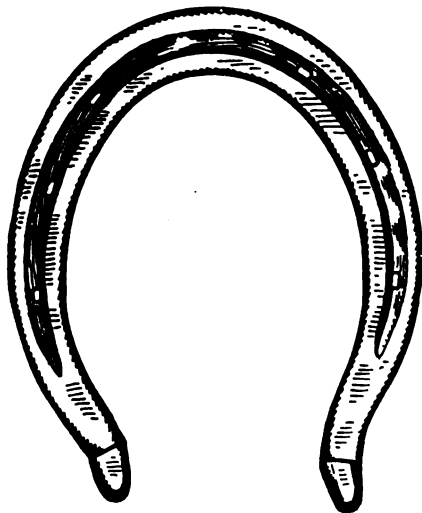
his talking apparatus would be silenced for the balance of the day.

"Well, byes, y'are a couple of good lads and I have here a good subject to diminstrate me ideas on one of the importint things that'll come up for discussion when ye are si-an-tiffick harseshoers, the same as meself, God save us from all harm.

"Now, to begin wid, this harse won't interfere if he carries his fut out where he had ought to; the throuble wid the poor devil is, no one but meself onderstands him; and when Denny wanders away to some poor, ignorant blacksmith to get him ironed off, because he can save tin cints on the job, they go battering away agin at their ankles, and thin the shame-faced miser comes crawlin' back to your Uncle Jim wid his lame excuses, sayin' I was away



from me shop when he come; manin' be that, of coorse, that I had been floored wid me jag. Sure, I can put me head in a flour sack, drunk or sober, and shoe a harse better than



HIND SHOE WORN BY DON
CHENAULT (3), 2.05¾

any of thim, yerselves included. But be the same token I'm thinkin' that some day ye will bate me, for I'm gettin' past the centhral part of me useful life, and me intellect is beginnin, to squeak when I ask meself for a supreme effort. Now this ould harse I've shod perfectly level and as light as I cud; he is a harse wid a long leg and a long stride, and if Denny the miser wud put something before him to ate so he cud steam up a bit he wud throt a mile in two-forty. Now, watch me close, lads, and don't ye never whisper of what ye see in this diminstration, for this is one av me secrets."

Taking a piece of five-eighths round iron, that he used for a poker, he heated it the full length to a cherry red; then, cocking his hat on one side of his head, first lighted his "dudeen" and after taking a puff or two he gave us a wise look and stepping up to the old subject of his "diminstration" he pulled the tail aside with his left hand, then with the hot iron he began to sear the inside of the subject's hind legs close up to his body. The old horse was too weak to make much resistance; a few snorts of disapproval being about all he could do. The same treatment was given the other one, and then "Professor McFadden" proceeded to rub on his "magic intment" taken from a box containing axle grease. Soon the owner

came in and McFadden explained that in order to make the job satisfactory he had found it necessary to "trate the coords on the inside of the legs, d'ye see, and ye'd better take along wid ye a box of me intment and trate thim at home wanst a day."

Denny paid for the job and finally concluded to dig up another quarter for the "intment," which the professor had done up in a tomato can because the regular sizes were all out of stock, "the demand had been so great for it."

When the team left the shop you can imagine how wide they walked behind; you could have rolled a flour barrel between their hind legs, and there certainly was no danger of their interfering for a few days at least.

"What's the theory, Jim?" we asked of the grim old "Mick" as he watched the old pelters amble down the street. With a smile on his smut-covered face that denoted his satisfaction at the success of his work, "Thay ain't no thaory goes wid that kind of wurruck; that's si-an-tiffick harseshoein' illustrated for the benefit av the risin' gineration—an' meself.

"All thay is about it, lads, is this: We have to tache the harse the same as we do our childer; be burnin' him bechune his hind legs I am tachin' him that if he wants to thravel aisy he must thravel wide, an' that's the si-an-tiffick docthrin' av curin' an interferer. An', another thing, byes, when ye get to be a si-an-tiffick, practickular farrier, the same as meself, be careful an' don't put anythin' on a harse's fut that'll hurt it; if the laist thing is hurtin' a horse's fut, he wont do his best. He can't, d'ye see? There's a lot of blacksmiths that wud be as good as meself if they only had sinse enough to put a shoe on a harse so it wudn't hurt him. Anytime ye have a lame harse to shoe, and ye don't know eggsactly what's the matter wid him, put a bit of sole leather under the shoe and plaster his fut wid pine tar; if he gets well, the owner will think ye are a great harseshoer, an' if he don't, ye can tell him he's lame in the shoulder. A fine line av talk is a good thing at times. I raymimber about tin years ago I was over to Larry Dolan's shanty. Larry worked on the railroad, and Nancy, his

wife—God rest her sowl, for she's dead an' gone—kept a little store an' she kept all the bukes in her head; the poor woman was dyin' an' we war settin' around thinkin' of the fine time we'd have at the wake. Every wanst in a while she'd call Larry to the bedside an' tell him of a bit of money somewan owed her for groceries an' things. She had been layin' quiet and aisy for a long time, then the poor ould woman beckoned to him.

"'Larry,' sez she, 'Tim Sullivan owes me two-forty-five for flour an' bacon; see that you get it.'

"'Larry had a little buke an' a pincil an' he marked everythin' down, an' then he'd roll his eyes up like this, an' fold his arrums like this, an' say 'Oh, glory be to the Lord, but she's sinsible to the last.'

"At last she beckoned Larry over. 'Larry, ashore,' sez she, 'I owe tin dollars for the last bundle of stuff from Rochester; see that it's paid.'

"Poor Larry rolled his eyes up to the ceilin' wid a look av anniegish on his dirty face an' groaned: 'Arra, tare an' ages: but there she goes ravin' again,' an' the divil a mark at all he made in the little buke.

"An' that's the way it goes in the harseshoein' business. If ye have a good gift of gab, an' can do a good job wanst in a while, ye are all right, if ye happen to talk to plaze



From "Life"

NEW CLERK: WHOA!—EXCUSE ME, MA'AM; I LEARNED THIS TRADE IN A BLACKSMITH SHOP.

the owner; but if ye don't, he'll say ye are as crazy as a bed bug."

Jim was an interesting old cinder-head when he was wound up, and as he had begun to wabble a little we called him back to the original subject.



"Say, Uncle Jim, won't that horse interfere again when those burns are healed up with the ointment?" we asked.

"He might, but the intment ain't very sthrong an' he'll need shoein' agin be the time he gets well."

"What are you going to do with all the money you get for the ointment?" we asked.

"Oh, thin, that's aisily answered," replied Jim. "We'll invest it in a little more suds. Here, Johnnie, me lad, go after it."

"Big bucket or little one?" chirped Johnnie.

"Yes, av coorse," replied Jim.

"What do you mean?" asked Johnnie.

"I mane both av thim. I'm as dhry as a church steeple afther me extindid discoorse."



Queries— Answers— Notes

Another Spring Query.—I would like to ask through the columns of the journal the best and neatest way to make the cup ends for lap main plates of elliptic springs.

R. H. A., Australia.

Tire Questions;—Mill Picks;—Flared Hoops.—Can anyone give me a table of the expansion of various-sized tires at various heats? Assuming that an iron wheel will not dish or break in any way, what happens if a tire made smaller than the

ing forms dish. (This is where the cold tire setter comes in by being able to stop when all is right.)

In tiring an iron wheel, slack the weld and allow the tire to cool itself. The wheel will stretch the hot tire for the unnecessary draft there is.

My experience of mill picks is that the forging is responsible for a number of breakdowns. Careful, thorough heating and working, and hammering on the flat with the finishing heats evenly on both sides, are essential. If the cutting edge fans out wider than the stock, grind the sides almost off and level the edge slightly, thus clearing the stock. If the edge is left wider, the corners have no backing, but do not hammer the sides in. Harden at a cherry red, in:

6 gallons clear soft water with the chill taken off

2 ounces each of alum and saltpetre

1½ ounces of salt

½ ounce sal-ammoniac. Mix all thoroughly, and draw no temper.

To put on a hoop as at A would require a flared hoop. This is usually done by hammering one edge of the hoop until it fits. The laths, BC, BC, have long slots in, and D is a wing nut on a bolt. Place laths as shown, and when both are level tighten D. Now with F as a center and FB as a radius, draw arc in convenient place. Bend hoop edgewise, corresponding outside edge to arc, then bend flatwise and weld.

THOS. R. GREYTON, England.

An Oxy-Acetylene Plant.—I would like to ask Mr. Waychoff through the columns of the paper about the construction of the oxy-acetylene welders. In the September number there is an illustration of a torch completed, Fig. 5. Now I would like to know if this piece of ¾-inch brass pipe filled with mineral wool will act as a flash-back arrestor. Also is it necessary to use the one described in Fig. 2 of the July issue? Also the acetylene generators (Fig. 1 in July number), I would like to know if the thickness of the iron in the tank will afford sufficient thread for the 2-inch nipple.

JOSEPH FLEMING, Minnesota.

On Spring-Welding.—I would like to have some brother smith tell me how to weld seat springs so that they will give good service.

W. C. LEBOW, Missouri.

In Reply.—Mr. Lebow doesn't say just what style of seat springs he refers to; whether the spiral spring for cushions or the common flat spring set up elliptically and used generally on trucks and heavy wagons. If he refers to the spiral springs I think he will find new ones cheaper and more serviceable than trying to weld old or broken ones. The flat-leafed, elliptical springs are welded the same as ordinary

between 40 and 50 pounds. I have heard considerable talk about this hammer in dredging circles for the past six years. I live in New Zealand, and dredging for gold is the main industry. The dredge buckets are 6½ feet contents, and the wearing parts are made of manganese steel, i. e., the four bushes that fit into the holes where the pins work. Sometimes these bushes become very tight, and being five or six inches long it requires two men with a 24-pound hammer and a great deal of labor, whereas one blow from a large or heavier hammer would start them. PATRICK WEAVER, New Zealand.

A Wisconsin Shop.—The accompanying engraving shows a picture of my shop. I have a good business and receive the following prices for my work: common shoes, \$2.00 a horse; shoeing drivers' steel countersunk shoes, \$3.00; bar shoes, \$1.00; hand-turned shoes, \$1.00 each; light driving Never-slip shoes, \$3.00 per set; Never-slips for draft work, \$7.00 a team; Giant Grip shoes, per team, \$9.00.

You can see from the above that I am getting proper prices, as I do not believe in working for fun. I have been at the trade



MR. SIMON'S SHOP OF WISCONSIN

for eighteen years, and like the work. Besides horseshoeing I do all kinds of repair work, and I think a great deal of THE AMERICAN BLACKSMITH for the assistance it is in my business. A. L. SIMON, Wisconsin.

An Ignition Query.—I would like to ask the auto man the following question: When a master vibrator is properly connected on a Ford, what allows motor to start with the four-unit coil switch on magneto post?

W. H. DAVIS, South Dakota.

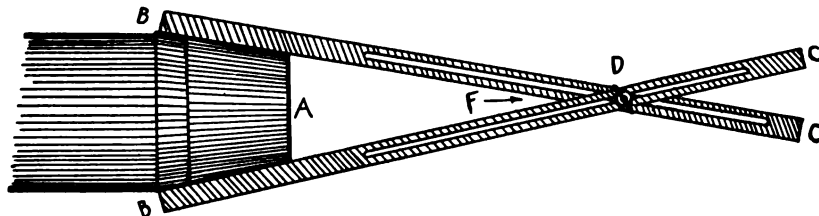
In Reply.—Mr. Davis does not state his question quite clearly. Does he mean that a spark is generated in starting the motor with the switch on "Mag," instead of starting on "Bat." and, after getting the motor to turn, switching to "Mag."? It is possible with some magnetos to start a motor on the magneto, thus making it unnecessary to start on the batteries and then switching to the magneto. If Mr. Davis will state his query a little more clearly we can probably give him the information he wants.

F. H. M., New York.

On Oxy-Acetylene Fluxes.—I would like to receive the following information: (1) What kind of welding fluxes are best for welding by the oxy-acetylene welding process? (2) What sizes of rods are best, and are there any special materials that are used, also where they can be purchased? I have an oxy-acetylene plant almost completed which I have made from the instructions given by Mr. Waychoff in the paper.

G. E. BARTELL, Washington.

In Reply.—(1) Salt or borax is the best welding flux for the oxy-acetylene process. (2) The size of the rod or feeder had best



MR. GREYTON'S METHOD OF MEASURING FOR FLARED HOOPS

wheel, and which would not burst, were put on and cooled quickly?

We find that the measurements outside a wheel and inside a tire are exact when the tire is on and cooled. In fact, so exact that it requires mechanical means to remove tire instantly. (I get them off by hacksawing through.) When all is tightened up by a contracting tire, the extra shrink-

wagon or buggy springs. There have been several articles on the subject in recent issues of "Our Journal."

A. M. L., New York.

A Two Handled Hammer.—I would like to know whether or not there has ever been made or used a hammer with two handles or, in other words, a two-man hammer. Of course it would be quite heavy, weighing



not exceed one half an inch—a quarter-inch wire is better—this of course depending upon the size weld to be made. No special materials are necessary.

A. M. B., New York.

Welding Springs.—In the September number of the journal I see where one smith gives his method of welding springs. I used the same method for a good many years and always obtained good results, although I make the lap a little different. For instance, where he has a straight lap I pene them out so that they will overlap



HOW TO WELD SPRINGS

each other. This covers the hole and serves as a lock (see the engraving) that holds the work in place a great deal better.

Many smiths lose a good weld because sufficient care is not exercised when taking the weld from the fire, which being quite hot at the weld is consequently weaker and the end drops down and pulls the laps apart.

H. N. POPE, Connecticut.

A Heating Pit and Cooling Basin.—In reply to Mr. P. J. Oram's query in the December number I present a diagram of a tire-heating pit and a cooling basin. The heating pit is six feet across when finished; both are built in the ground. When digging the heating pit make it seven feet four inches across, and line it with firebrick. Allow the brickwork to extend four inches above the top of the ground. The chimney and the air inlet are opposite each other and the air inlet has a door in it with which to shut off the air. The cover for the pit is made of old boiler plate hinged to the

wall with an eyebolt so as to fasten a rope for a counterweight.

The cooling basin is built similar to the heating pit and as close to it as possible. It is dug six feet eight inches across and two feet deep, and is lined with concrete, instead of brick as in the heating pit. Allow the concrete to come six inches above the ground, with a slope to the rim above ground, so as to keep the dirt and trash from working into it. If possible, provide a drainpipe in the basin for drainage when the water gets old. Of course, neither chimney nor air inlet is necessary, and the cooling machine, which can be obtained from any of the supply houses, is set into this pit. This arrangement works well. The heating pit requires only about half as much wood as is needed when heating in the old way.

The hook shown at X is for handling the hot tire, and is made of $\frac{1}{2}$ by 2-inch stock.

R. M. DWELLY, Kentucky.

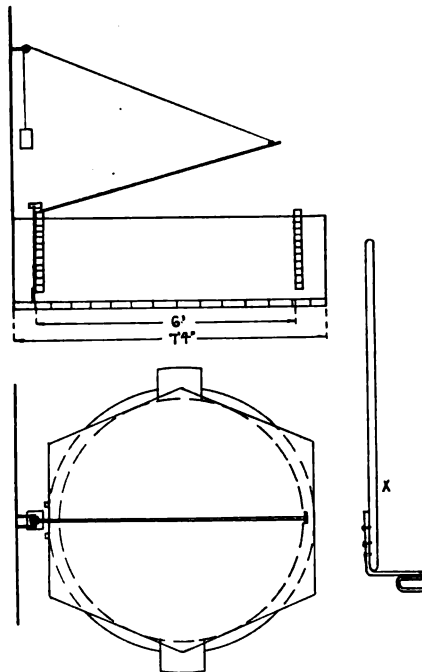
Curing Contraction.—Some time ago I read an article in our paper for the cure of contraction in the heel of the horse's foot or hoof, and I did not quite agree with it. My cure for this trouble is to cut down the hoof to normal size; fit the shoe to the hoof, being sure that it is the correct shape; nail it on so that there is no pressure on the toe clips nor on the heel; then clinch tightly. Now place your pinchers between the heels of the shoes and open them at each shoeing until the width is normal. In some cases $\frac{1}{4}$ inch is too much, but this can be determined by trying with $\frac{1}{8}$ inch first.

H. J. NEILSEN, Queensland.

Hardening Iron.—I would like to get a recipe for hardening iron. I have heard that it could be done and have been told that iron could be hardened hard enough to cut iron. If such is the case I will very much appreciate receiving a recipe or information on the subject.

W. W. EGLY, Pennsylvania.

In Reply:—Articles made of malleable iron may be hardened by heating in molten cyanide which is heated in an iron dish of suitable size; the articles being suspended in the dish until heated sufficiently, when



FOR THE HEATING AND COOLING OF TIRES

they are quenched in a bath of cold or warm water, according to the nature of the work to be done. Should this prove to make them too hard, a bath of tallow or oil is used. In order to get satisfactory results, be sure to have the cyanide of potassium chemically pure. As for hardening iron enough to cut iron, we have yet to hear of such a feat. Perhaps some other brother may enlighten us.

E. V. S., New York.

Tempering Auto Springs.—I have been reading an item on spring-tempering, and will relate my best results in tempering springs: After welding each leaf I give it its proper shape. I then clamp a bolt in the vise long enough to accommodate two leaves, using a ring nut on bolt; then place main leaf of spring on bolt and heat the next leaf to a cherry red; place this on first leaf and tighten nut; grip the leaves with tongs at tips and dip them in soft water until cold. After the springs have all been treated, draw temper over forge and heat to a black heat and lay aside. This is a little complicated, but will stand the severest road test.

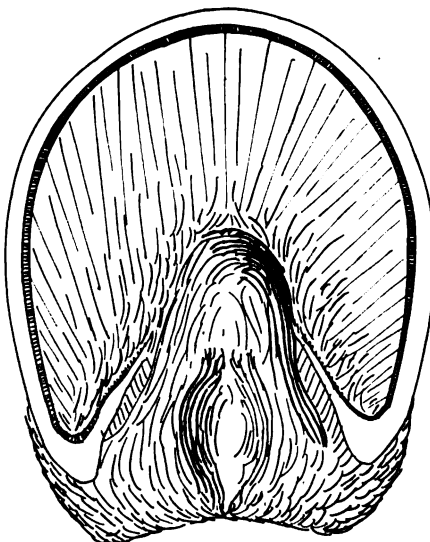
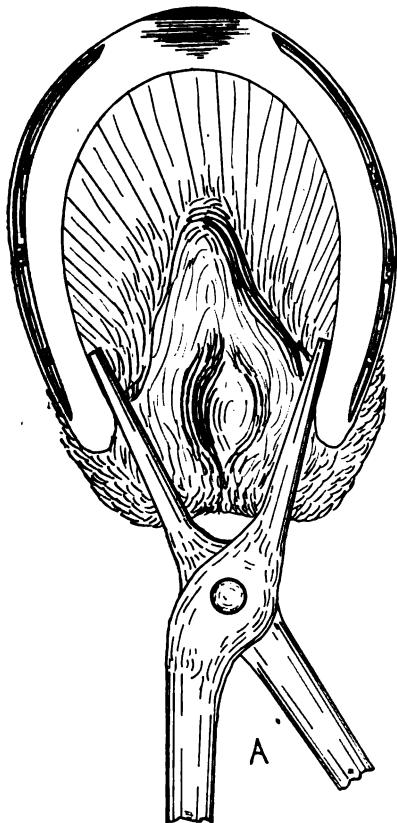
Another hint for the auto repairman is as follows: In removing the cylinder head from a Ford motor it often happens that the cap bolts will be set. Tapping the heads of these bolts with a light hammer will be found a simple way to start them. If one tapping is not sufficient, repeat.

W. H. DAVIS, South Dakota.

Oxy-Acetylene Welding.—I would like to have a thorough understanding of just what is needed in the way of welding material for different kinds of work and just what kind of fluxes are used with an oxy-acetylene welding plant. I intend building one for my own use and any information you can give me will be highly appreciated.

Trusting that you can start me out right, or have some neighbor blacksmith who has a plant do so, I remain,

ERNEST E. EHLEER, Oregon.



B

A

MR. NIELSEN OF QUEENSLAND EXPRESSES HIS IDEAS ON THE CURE OF CONTRACTION

In Reply:—To quote Mr. Waychoff, "The principle of oxy-acetylene welding or autogenous welding is a fusion of the metals by heat, thus making them solid as one piece. This is accomplished by what is known as a feeder—a wire or rod of the same kind of metal as the article that is being welded." Salt or borax is used if a flux is recommended in welding certain metals. For further detailed information, consult the November issue in which Mr. Waychoff tells, "How To Weld."

EDITOR.

A Specialty Smith.—I am sending you some pictures of my place. I run a one-fire shop and do all grades of light work. My specialty is ice tongs and axes. I have a good sale for tongs and have sent them as far as Canada and South America. My other work is varied, as I do automobile and telephone work, make and repair springs, light carriage work, machine forging and general jobbing. I have a motor to run the fire, also one for the drilling machine and emery wheel. I have a punch, shears and a tire upsetter. I like good tools and lots of them. A good workman may be able to work with poor tools, but I want good ones. H. B. BRALEY, Massachusetts.

Nickel Plating Steel.—Would some brother please give me a recipe for putting a good nickel plating on steel? Thanking you in advance for the information,

W. J. POWELL, Tennessee.

In Reply:—First, clean by dipping from 15 to 30 seconds in a pickle of 6 parts sulphuric acid, 1 part muriatic acid and 160



MR. BRALEY OF MASSACHUSETTS
AND SOME OF HIS WORK

parts water. Second, copper plate. Dissolve and cool, in an iron vessel, 2 pounds of copper sulphate to 1 gallon of hot, distilled water. Add about 4 ounces of liquid ammonia and, gradually, add 12 ounces of potassium-cyanide solution. Leave exposed to air for two hours, filter and dilute with 3 gallons of distilled water. The article to be plated is attached to one end of an electric current, a pure copper plate on the other, and placed in this solution. The current, made of three or four dry cells, should flow from the copper to the article. Ten or fifteen minutes is long enough. Take out, rinse in hot water and place in nickel vat. Dissolve the double sulphate of nickel and ammonia in proportion of $\frac{3}{4}$ pound to a gallon of hot, distilled water in an iron kettle. Cool, filter and pour into a vat. Use only best quality materials. Attach article and a nickel plate to electric current in solution. The solution should be slightly acid. (This is tested by litmus paper—acid turns blue litmus, red.) Leave goods in two or three hours, according to work.

E. V. S., New York.



The Automobile Repairman

A stud broken off short in a casting or some other part of a motor car is usually a difficult matter to remove, so that a new one may be inserted. The best way to go about the removal of the broken portion is to drill a hole in the center of the part broken in. This hole should be of a certain size, depending on the diameter of the stud. For a $\frac{3}{8}$ in. stud a bare $\frac{1}{4}$ in. diameter hole should be drilled, care being taken to drill right down the center of the stud, so as not to damage the thread. A flat-nosed drill should be used, and should be ground so that it cuts only when rotated in the left-hand direction, and not in the right, as the usual drill is ground. The reason for this is that if the stud thread be at all slack the rotation of the drill and the cutting action will tend to screw out the stud, which will very often come out readily before the hole is drilled very far. If the stud does not come out as described, then, after the hole is drilled through it, a square reamer is lightly driven into the hole. A lathe carrier is fixed to the top of the reamer and the stud twisted out by rotating the carrier anti-clockwise. If the drilled part is very fast and then will not readily come out, the only thing to do is to chip the broken part with a sharp round-nosed chisel. This usually has the effect of cracking the skeleton of the stud, and the pieces can be fished out of the hole with a piece of bent wire.

A tire valve should never be allowed to remain uncovered; if the cap be lost, cover it with a piece of leather or rag and a rubber band or string round the stem. If dirt is allowed to enter, a leaky valve is bound to result.

In tightening a series of bolts it is a great mistake to tighten one at a time, either completely or partially, or even to tighten up several adjacent bolts of a series. The proper method is to go around the whole series consecutively, drawing the nuts down little by little. This is of particular importance when bolting together the parts of a crank case, change gear case, etc. These parts are usually made of aluminum, and even the slightest inequality of pressure, as above, will often spring the parts to such an extent that oil-tightness is destroyed.

Valve grinding would appear to be a simple enough operation, but it can be performed in the wrong way, and it is surprising how many will naturally adopt this way. For example, too coarse a grade of emery is used instead of the finest flour emery obtainable, then some oil is poured on the valve seat and the face of the valve, a pinch or two of emery is sprinkled on them and the grinding is pro-

ceeded with vigorously. The inevitable result is scoring of the valve and seating, and the valve guide and stem are badly abraded and worn, and very likely some emery finds its way into the cylinder. Only a light touch of the grinding mixture previously made need be smeared on the valve face, and every now and again the valve should be raised off the seating and moved to a different position. Crocus powder is excellent to obtain a good finish, and the greatest care should be taken to clear away every trace of the grinding material when the operation is concluded.

When springs have become rusted up, the only cure is to take them down and remove the rust. This will necessitate jacking up the frame and supporting it while the spring shackles are released and the running gear detached. The springs will then have to be dismantled, each individual leaf cleaned with emery cloth, well lubricated with grease and re-mounted. Do one spring at a time, so that the leaves, bolts, etc., may not become mixed. Even in modern cars, entirely insufficient facilities are provided for lubricating the leaves of suspension springs. It is generally necessary, once in a while, to jack up the frame and body, so that the springs are entirely freed from all weight and hang slack. While in this condition it is possible, by considerable and messy work, to induce some lubricant to find its way in between the shorter leaves. A very thin knife blade, a stiff brush and a thin oil—sometimes only kerosene will get in—are the materials.

Removing the coating of verdigris which forms when motor lamps have been subjected to the weather, or have been in stor-



A CORNER OF MR. BRALEY'S SHOP

age for a time without being cleaned, is necessarily difficult, and ordinary cleaning polish or paste may not do. Even the application of considerable "elbow grease" helps matters but little. The following mixture will remove the verdigris, and if it will not thoroughly restore the lamps to their original brightness, it at least will prepare a surface which can be highly polished by the use of the ordinary article. Mix a good metal polish with wood alcohol and apply the resulting mixture to the brass portions of the headlight, allowing it to dry. In a short time rub with the regular woolen cloth; the verdigris and stains should then come away, leaving a fine surface.

A large, quick-action oil gun is a handy appliance which is easily made from an old bicycle pump by plugging up the outlet and drilling and tapping the bottom plate for a nozzle. The bottom plate can be cut down to the diameter of the pump barrel in case it has an extension to be held by the foot when pumping.



Starting a long unused motor is easy when you know how. The root of the trouble is that during the long period of idleness all the oil has run from the cylinder walls into the crank-case. The pistons are consequently dry, and the metal surfaces are, therefore, in direct contact with each other, so that they will not hold any gas pressure. If a small quantity of thinned lubricating oil is injected it will flow between and around the piston rings and form a good gas seat; it will disperse the old, dried oil by liquefying it and so rendering it useful; the motor will answer sweetly to the crank; a good suction exerted on the carburetor, and the engine will start merrily.

Adjustments On the Ford Car and How to Make Them

Clutch Adjustment

Adjustment is provided by means of the screws in the clutch fingers—giving each screw an equal number of turns to the right tightens the clutch. After a considerable period of service, the wear in the clutch may be taken up by installing another pair of clutch discs rather than by turning the adjusting screws in too far.

If the clutch pedal when pushed forward into slow speed has a tendency to stick and not come back readily into high, tighten up the slow speed band as directed below. Should the machine have an inclination to creep forward when cranking, it indicates that the clutch lever screw which bears on speed lever has worn, and requires an adjustment to keep the clutch in neutral position.

Slow Speed, Brake and Reverse Band Adjustment

The slow speed band may be tightened by loosening the lock nut on the right side of the transmission cover and turning the adjusting screw, A, Fig. 1, to the right. To tighten the brake and reverse bands, remove the transmission case cover door and turn the adjusting nuts, B and C, on the shafts to the right. See that the bands do not drag on the drums when disengaged, as they exert a brake effect and tend to overheat the motor. When the bands are worn to such an extent that they will not take hold properly they should be relined, so that they will engage smoothly without causing a jerky movement to the car.

To Remove Transmission Bands

Take off the door on top of the transmission cover and run the

clutch band adjusting nuts, B and C, to the extreme ends of the brake and pedal shafts; then remove the slow speed band adjusting screw, A; loosen bolts holding transmission cover; take hold of slow speed pedal and lift off the cover assembly; slip bands forward; sliding the one nearest the flywheel over the first of the triple gears; then turn the flywheel over until opening in band is down where it may easily be lifted out. To do this requires the spreading apart of the bands at the ears and is more easily accomplished if the three sets of triple gears are so placed that one set is about ten degrees to the right of the center at top. To replace, reverse this procedure, and when fitting the transmission cover see that the clutch release ring rests into the rear groove of the clutch shaft.

Front Axle

To remove front axle, jack up front end of car so wheels can be removed; disconnect steering gear; disconnect radius rods at ball joint and remove two cotter-pinned bolts

Once every thirty days the axle should be carefully gone over, to see that all bearings in the bushings, spring connections, spring hangers, steering knuckles and hubs are thoroughly lubricated and that all nuts and connections are secure, with cotter pins in place.

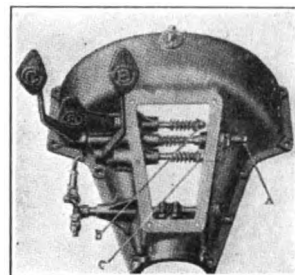
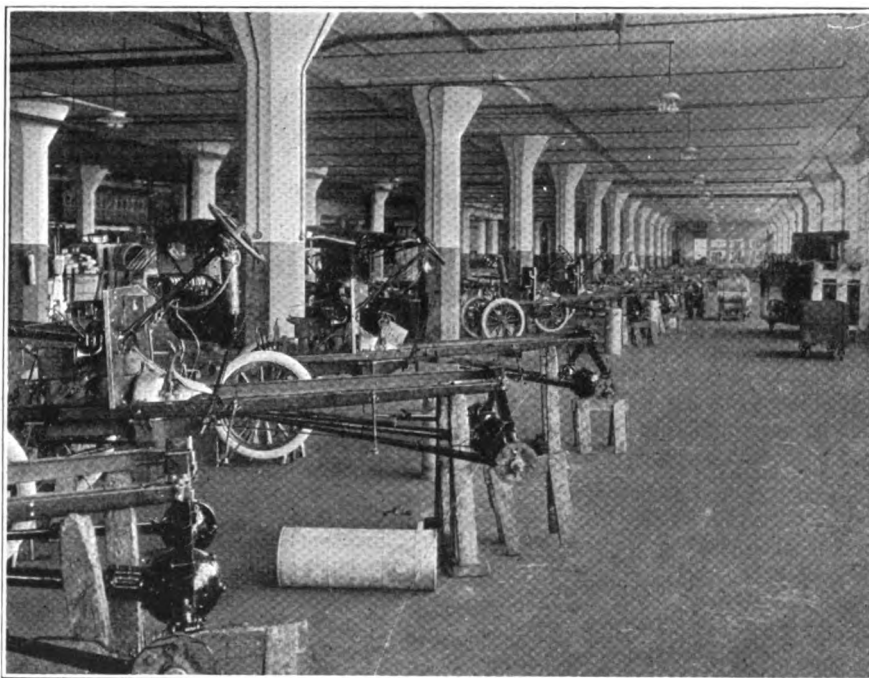


FIG. 1—THE TRANSMISSION COVER

The spring clips which attach the front spring to the frame should be inspected frequently, to see that the nuts are not working loose, as this will interfere with the steering.

Bent Front Axle

Should a steering knuckle or axle



A VIEW IN ONE OF THE ASSEMBLING DEPARTMENTS AT THE FORD PLANT

from shackle on each side, so detaching from spring.

To disconnect radius rods from axle, remove cotter-pinned nuts. To remove entirely, take the two bolts out of the ball joint and remove lower half of cap.

become bent it is necessary to have a large gauge or jig to straighten it accurately. The eye is not sufficient to determine whether it is correct; and excessive wear of the front tire will be the result of inaccuracy in this place.



Steering Gear

The gears which are arranged in the "sun and planet" form are located at the top of the post just below the hub of the wheel. By loosening the setscrew and unscrewing the knurled brass cap, after having removed the steering wheel,

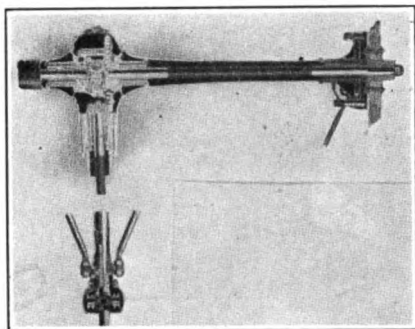


FIG. 2—SEMI-SECTIONAL VIEW OF REAR AXLE

they may readily be inspected and replenished with grease.

To remove steering wheel, unscrew the brass nut on top of the post and force the wheel off the shaft.

To take up wear in steering gear, disconnect the two halves of the ball sockets and file off faces until they fit closely around the ball. If ball is badly worn it is safest to replace it with a new one.

To remove steering shaft, remove pin and disconnect steering arm from bottom of post; unscrew knurled cap from gear housing; lift off wheel with center pinion; push shaft upwards.

Muffler

To disconnect the muffler it is not necessary to disconnect the exhaust pipe from the motor (although it is a good plan and a simple matter, necessitating only unscrewing of the union), disconnect muffler from frame; unscrew union at forward end of pipe; drop down so it will clear the frame and slip back off the tube.

To clean muffler, remove nuts on ends of rods which hold muffler together and disassemble. To reassemble muffler, reverse above operation; being careful not to get the holes in the inner shells on the same side or end.

Remove Rear Axle

Jack up car so that wheels hang free; take out the four bolts connecting the universal ball cap to the transmission case and cover; disconnect brake rods; unscrew hub cap; using special hub wrench

furnished with the car; remove nut from end of axle shaft; pull off wheel by means of wheel puller; remove nuts holding spring perches to rear axle housing flanges.

To disassemble rear axle and differential, disconnect drive shaft tube by removing nuts in front ends of radius rods, and the nuts on studs holding drive shaft tube to rear axle housing; remove bolts which hold two halves of differential housing together.

If necessary to disassemble differential gear, a very slight mechanical knowledge will permit one to immediately discern how to do it, once it is exposed to view. Care must be exercised to get every pin, bolt and key lock back in its exact position when reassembling.

In replacing rear wheels, be sure that nut on axle shaft is as tight as possible and cotter pin in place.

To Remove Drive Shaft Pinion

The end of the drive shaft to which the pinion is attached is tapered to fit the tapered hole in the pinion which is keyed onto the shaft and

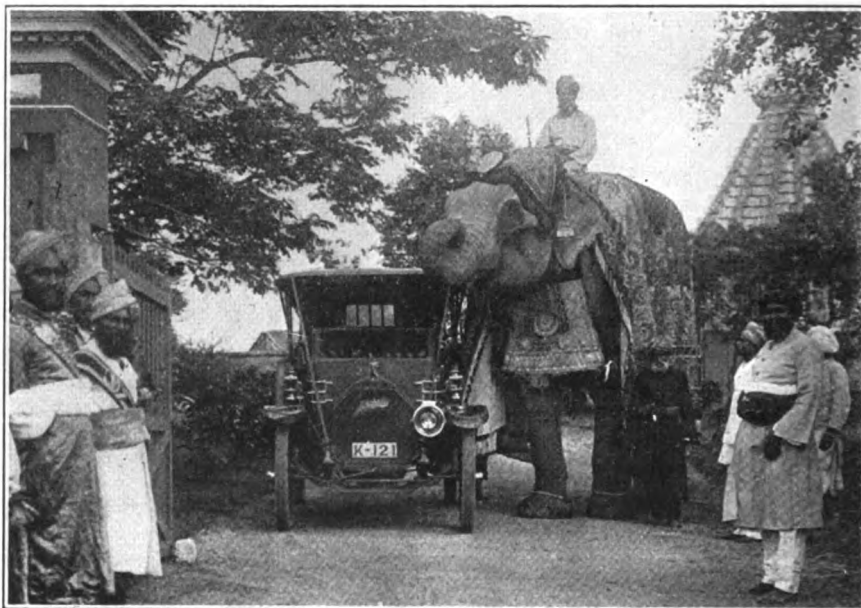
in position by a ring which is in two halves and fits in a groove in the rear axle shaft. To remove the compensating gears, force them down on the shaft that is away from the end to which they are secured; drive out the two halves of ring in the grooves in shaft with screwdriver or chisel; then force the gears off the end of the shafts.

To Remove Large Driving Gear

Take out the capscrews holding gear to differential case.

To disconnect universal joint from drive shaft. Remove two plugs from top and bottom of ball casting; turn shaft until pin comes opposite hole; drive out pin; remove four studs holding ball housing to drive shaft tube and drive the universal joint and housing away.

Wear in the universal joint may be taken up by disconnecting the two halves; cutting off the rivets with a cold chisel and carefully filing or turning down the faces so as to allow them to come together. The hole will not then be perfectly round and should be carefully scraped or



AN AMERICAN MOTOR CAR IN INDIA AND A NATIVE "HORSELESS VEHICLE"

then secured by a cotter-pinned "castle" nut. To remove the drive shaft pinion, simply unscrew the castle nut and drive the pinion off. The method of attaching the large compensating gears to the rear axle shaft differs from that which is used in attaching the drive shaft pinion to the drive shaft. If you will examine the rear axle shafts you will notice that the gears are keyed on, and held

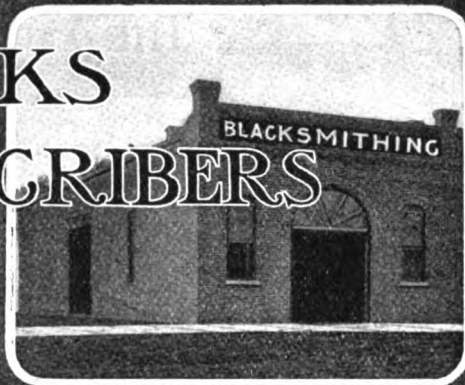
reamed to fit. Excessive wear in the steel parts calls for replacement of these parts.

If rear axle or wheel is sprung by skidding against a curb, or through any other accident, it is false economy to use it. Tires, gears and all other parts will suffer. If axle shaft is bent, it is better to get a new one than try to straighten the old one.

(To be continued)



TIMELY TALKS WITH OUR SUBSCRIBERS



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So, if you have done any automobile repair work, let us hear from you. No matter how small the job or how big, explain it, give us a rough pencil sketch, or two, of it, and we will do the rest.

A Talk on Bookkeeping

Mr. H. M. Totman's talk this month is on bookkeeping. If you haven't time for another item in this entire issue don't fail to read, study and re-read this sound, practical article by Mr. Totman. He is giving an explanation of his own practical system of business administration, and you'll want to know all about his bookkeeping method. If you do not get some real good, real help and real inspiration out of Mr. Totman's article it will be simply because you don't want to. So study this article by Mr. Totman—don't simply read it over—there's too much in it to get by simply reading it. Study it and think and then apply his principles to your own business.

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True Business Pictures

An accounting system is a business picture. It is to the modern business man what the X-ray is to the modern doctor. The X-ray tells the doctor where to look for trouble. The real accounting system tells the business man where to look for trouble. And many business men—and a good many of them are smiths, sorry to say—through the use of poor systems are not getting a true picture of the condition of their business. In case of an emergency they would not be able to prepare a true statement of their business and its true worth. Their accounting systems do not account, and that is why so many smiths do not get the profits they should have. Their systems fail to point out the petty leaks that rob the cash drawer of the money which should represent profits. In smithing, as in every other line of business, the successful man is the one who always knows day in and day out just where he stands in a business way. If your books do not tell you the things you ought to know, the things you want to know, the things you must know to carry on your business profitably, then it's time to renovate your accounting system. A man may go right when he doesn't know where he's going, but he usually goes wrong.

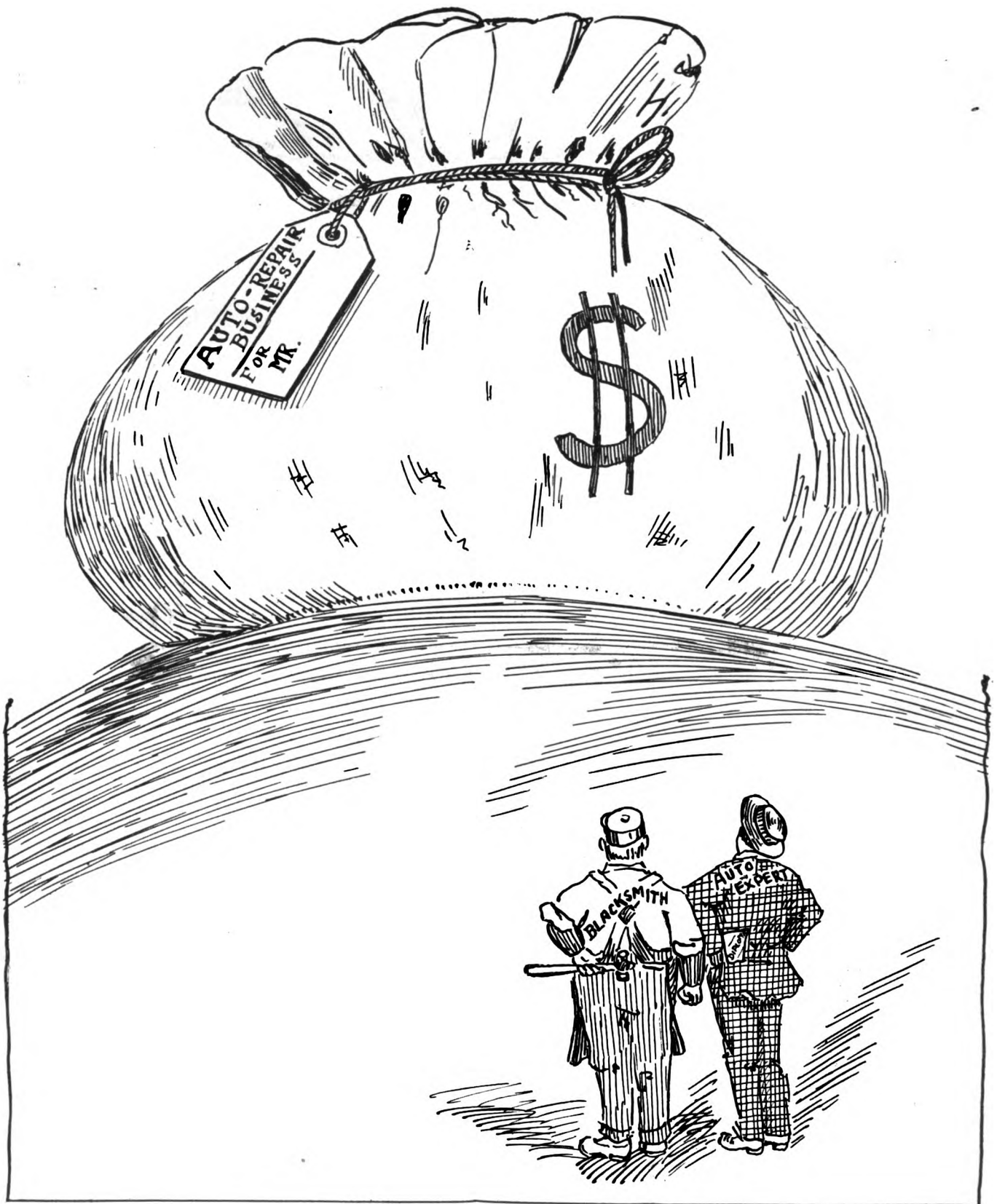
Real Helpfulness

As evidence of the real helpfulness of "Our Journal," just read with us the following recent letters. When readers tell just what is helping them they must have a very exact knowledge of the paper's worth. For example: Mr. John Bailey writes: "I can hardly tell you how much I appreciate your valuable paper. The recipes are worth many times the subscription cost—and in one issue I got a recipe that was worth three years' subscription. The advertisements are also very good."

Another reader, Mr. J. E. Peterson of Colorado, writes: "I enjoy your paper very much—it is very useful and helpful to me in construction and repairs, and its advice on business management is par excellent."

Then comes Mr. G. E. Bartell of Washington State; he writes: "I am building an autogenous welding plant as per your description in your paper. It is the best paper ever published for the trade."

And so we could go on enumerating and citing examples almost without number where "Our Journal" is proving of sound, practical help in every department of the smith shop. Where "Our Journal" is helping craftsmen everywhere to solve problems, to make work easier and to make working conditions better in every way.



WHOSE IS IT?
Are you making a bid for at least some of it?



Repairing Automobiles With the Oxy-Acetylene Blow Torch

F. A. GILMER

THE oxy-acetylene flame has become a very considerable factor in the repairing of automobile parts. Breaks, cracks and fractures that were (previous to the advent of the oxy-acetylene torch) thought im-

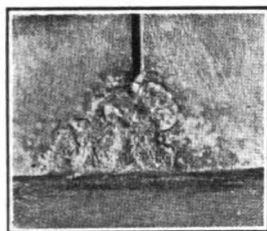


FIG. 1—ONE HALF INCH CAST IRON, SHOWING WELD IN THE ROUGH, ALSO LOWER EDGE DRESSED OFF, HERE THE UNION CANNOT

BE DETECTED. The reason why the practical smith and automobile repairman should not be equipped to do this work.

The process of welding as carried out with the oxy-acetylene blow torch is very different from the ordinary process of welding. The junctions of the metals to be united are neither lap nor wholly butt joints, as in the ordinary welding, but are chamfered or beveled off if not already of a form which permits the penetration of the flame to the remotest parts of the surfaces to be welded. This is shown clearly in Fig. 1, where the groove has only been partially filled with new material. Each side should be beveled about 45°, the two making a total right angle (90°).

It has been found a safe rule always to heat the metal to a liquid state to a distance on each side of an imaginary center line of the joint to the thickness of the metal being welded. Much more extended or restricted heating produces a poor weld. In the first case, because the metal at the center becomes so hot that it burns, since there is no chance for

radiation from the center through the highly heated adjoining metal. Heating too much, locally, gives excessive radiation and similarly results in a poor weld. It is best to keep the torch moving in a small circle while heating material, so as not to overheat the treated spot. The heat spreading from the path of the point of the flame naturally focuses at the center of the circle, so that the part becomes heated quickly to the desired point and can be nicely controlled. Fig. 2 shows a number of castings; all are of cast iron except the crank case which is of aluminum. The chalk marks show where they have been repaired. To effect such a weld, the edges are first chamfered off to form the V-shaped groove, having a right angle at the bottom. Then the casting must be preheated. Preheating is done with a specially

designed oil or gasoline preheating torch or with a charcoal fire or in a gas furnace. The welder can use his ingenuity in building a temporary furnace. (See foot note.) It is certainly much cheaper to heat a casting with gas at a dollar a thousand feet than with acetylene and oxygen at about twenty dollars a thousand. Preheating is necessary, because the difference in expansion of the metal, though slight for each degree of heat, when multiplied by many hundred degrees becomes a troublesome factor in cast metals and all brittle alloys. After welding, these pieces should be cooled carefully and slowly, because of the extreme internal strain. Preheating is also necessary for brass, copper, aluminum and all alloys which by their high heat-conductivity cool

Foot Note—See "Torches and Blowpipes," by Mr. Waychoff, in September, 1913, issue.

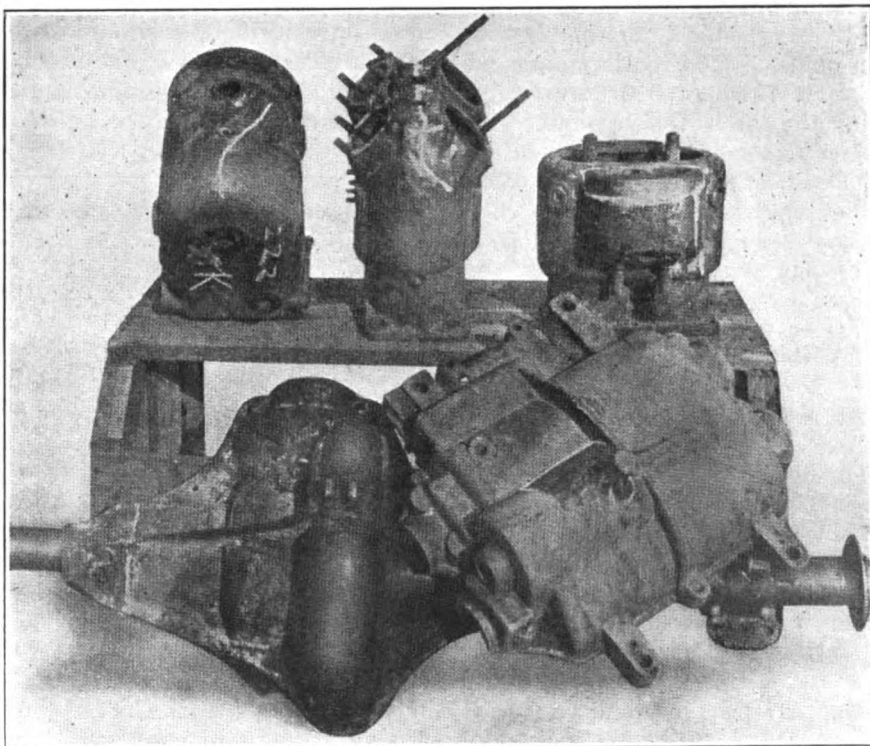


FIG. 2—A GROUP OF REPAIRED CASTINGS—CHALK MARKS SHOWING WHERE THEY WERE CRACKED OR BROKEN



the part to be welded so fast that welding is difficult. Metals like malleable iron do not need to be preheated, because their tough, fibrous structure easily takes up heating and cooling strains.

After chamfering and preheating the casting it is now ready to be welded. Beginning at the point of the V, the metal is fused and pud-

pression and then suddenly removing it. The momentum of the metal causes it to unite over the cavity. With a little care the operation can be done very successfully.

Fig. 3 shows a badly damaged aluminum transmission case, and the X's indicate the many points of repair. The lug, A, was also welded on. The welding of aluminum is something of

low melting point make it a difficult metal to weld. The difference in toughness and ductility in cast and rolled aluminum is very great, but some of this toughness can be restored by hammering the weld when hot. The operator must bear in mind, however, that when this metal is reasonably pure it is "hot-short" between 1112° and 1211° F., and may crumble or fracture under the hammer within this range. But, as a fine adjustment of the gases is obtained in the high-pressure torch, the temperature of the flame can be somewhat reduced, which facilitates the welding of aluminum.

Steel, as its carbon content increases, becomes increasingly hard to weld. The carbon is apt to burn out or, if it does not, the steel at and near the weld loses its essential properties, because its carbon has changed form. There are an almost infinite number of changes that take place within the range of tempering heat of steel, and high carbon steel welds can only be restored to their original properties by after-treatment. However, for our purposes, the steel is of a milder quality, and the present limitations are so well known that an operator knows pretty well what can and what can not be done. The automobile frame, for instance, shown in Fig. 4, can be welded under almost any conditions. The fracture is, of course, beveled and cleaned. The metal is then heated with the torch, and a steel melt bar of as near the same

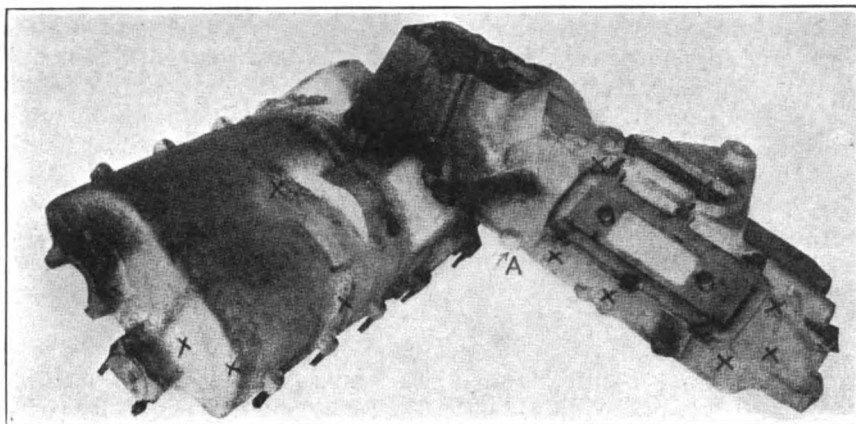


FIG. 3—SHOWING REPAIRS TO AN ALUMINUM TRANSMISSION CASE

dled, and the weld started with material supplied from its sides. When this has gotten fairly under way, additional metal may be supplied. A high-silicon cast-iron melt bar is best—low in sulphur and phosphorus (sand). It is necessary to use a flux or scaling powder made of salt, borax or similar chemical, to take up the iron oxide formed in the flame and to allow the metal to run freely. Using the torch, this is puddled together with metal from sides of the V. Of course, skill is required to carry on the operation, as cast iron runs freely at weld and has the peculiarity of flowing to the part having the highest temperature. It is, therefore, necessary when wishing to draw metal from one part to another to play the torch on the latter place, but, of course, keeping the other part molten.

The operator is aware of the blow holes he leaves in the weld, as the metal will not flow over these without special effort on his part; the hole showing as a depression in the surface which must be blown open with the flame, so as to close from the bottom, or as is often the case when it is due to sand or slag it must be dug out with an iron rod, to be eliminated. The special effort required to close over this depression consists of playing the torch in a circle around the de-

an art in itself. The metal is sensitive to oxygen, and it is best to have a slight excess of acetylene in the flame. The work to be welded is preheated after the fracture or edges to be welded are chamfered and cleaned. When heat is applied, the metal first assumes a pasty condition, and never becomes really fluid until almost at the burning point. It should not be allowed to reach the burning point, but when it becomes soft it is joined

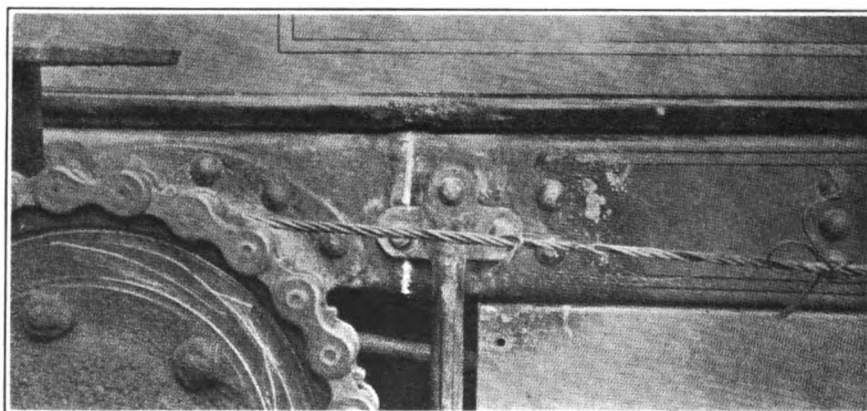


FIG. 4—AUTOMOBILE TRUCK FRAME WELDED AT POINT INDICATED BY WHITE LINE

by the puddling action of an iron stirring rod, rubbing and working into intimate contact. The great heat-conductivity of this metal, its tendency to oxidize rapidly and its

tensile strength and elasticity as the frame added to the weld. A scaling powder is used in steel welding. The joints should be worked or hammered while cooling, so as to build up the



structure that the melting has destroyed. The rough weld is then finished off.

To repair a crank, as in Fig. 5, which has developed a flaw or crack,

melts at the lowest temperature; in this case the bronze has the lower melting point, melting at 1692°, while steel melts at 2372°-2552°F. The reason for this is that molten

of repair work. A short cut is to thoroughly tin the rivet head and surrounding parts, after which fill a small tin cap from a soda bottle with solder and "sweat" it into place over the rivet head, thus accomplishing the repair in a neat and satisfactory manner. This "short cut" may be better appreciated when it is realized that the work as ordinarily done would have necessitated the delay and expense of removing the entire body, in order to make the tank accessible.

A large leak in the gasoline tank may be repaired by cutting a hole in the top of the tank which, after the leak is soldered, is repaired by a good-sized patch being soldered into position over the hole.

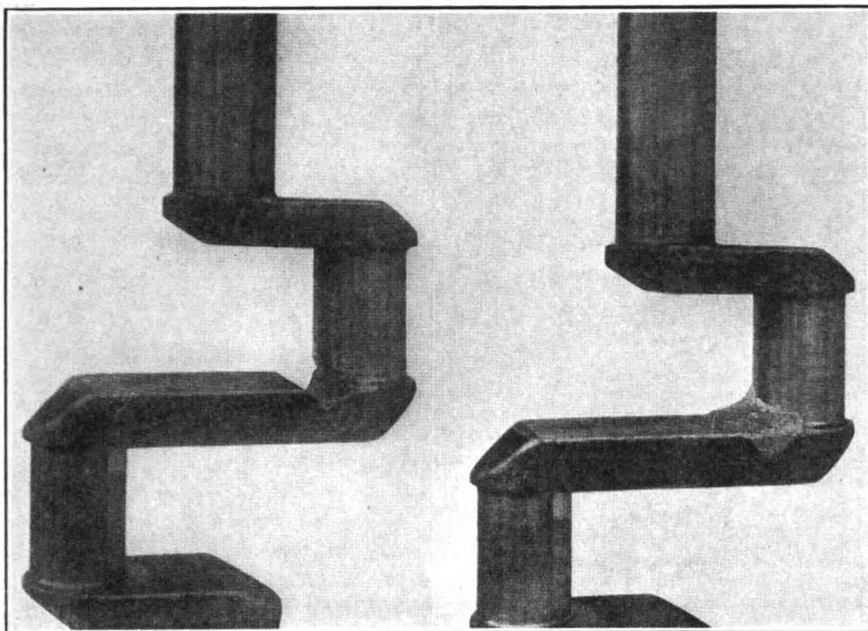
A hack-saw frame is a useful part of the blacksmith's tool equipment. Notches can be cut with great rapidity in a castellated nut by using two blades in this frame. A very thin file used in this frame is greatly strengthened and can be used much more efficiently.

A self-splitting cotter pin is sometimes necessary where it is an extremely difficult task to split the ends of the cotter so as to keep it in place. By sawing off about one eighth of an inch of one portion and bending the other over the end of the cut-off part this can be accomplished. A blow on the head of the pin with a hammer after the pin is placed in position bends the head over to one side, so that the bent end is drawn backward, automatically spreading the pin so that it cannot work its way out.

If the springs of a car have become very much rusted the only cure is to take them down. This will necessitate jacking up the frame, not the axle, and supporting it while the spring shackles and clips are released. The springs will then have to be dismantled, each individual leaf cleaned with emery cloth, well lubricated with grease and remounted. One spring should be done at a time, so that the leaves, bolts, etc., may not become mixed.

An air lock in the water circulation is a troublesome matter, and one which will probably puzzle the blacksmith more than anything else in connection with water cooling. There are several ways in which air locks or air pockets may be formed. By air lock it is understood that air has been drawn into the water pipes and forms a complete cushion between two bodies of water, which effectually prevents its flowing. One of the most frequent causes of forming an air lock is putting a fresh supply of water into the tank when there is a small amount of water running in the pipes which are below the level of the tank. The water rushing into these pipes prevents the air escaping, and thus the air lock is formed. To prevent this, if there is a small amount of water left in the radiator and connecting pipes, it has been found best to drain it completely away, put in fresh water, allowing the drain tap to remain open until this flows through. By this procedure the air will, of course, be driven out of the pipes, being forced through the drain tap by the water behind it.

The separation of the parts of an engine or car that may have become tightly stuck together because of dirt and corrosion during a long period of use is often a serious problem. In such a case, nothing promises better than recourse to a fairly liberal application of kerosene, supplemented by light but continued tapping with a hammer. By directing the taps judiciously, first in one direction and then in the opposite, now to one portion of the surface and then to another, and giving them as much force as is safe, long persistence will almost invariably result in the desired separation. Fresh applications of kerosene should be made from time to



FIGS. 5 AND 6—A CRACKED CRANK WITH THE FAULT CHIPPED OUT READY FOR WELDING; AND THE SAME AFTER WELDING AND BEFORE MACHINING

it is necessary just to chip out the metal, being sure that the bottom of the crack is reached and removed. This is ascertained by watching the chip as it turns up from the nose of the chisel; when it separates into two parts it shows that the crack has not been entirely eliminated; when finally the chip comes out in one piece it is known that the bottom of the crack is reached. It remains then simply to enlarge the opening, so that a suitable trough is left for the building up of the new material. It is then preheated in a forge, near the part to be welded, and built up with the torch, using a soft steel solder stick until the repair has the appearance indicated in Fig. 6. All that it needs now is the machining out of the excess metal in a lathe.

In Fig. 7 (Page 136) is shown an automobile axle which illustrates the practicability of welding steel and bronze. The steel tubes are shown to the right and left and are parts of the axle, while the casting in the center is a bronze housing for the differential gear. These parts were united by fusion welding, the joints being made as at A A,. When metals of different kinds are being welded, the stick should be of the same material as the one of the two to be joined which

bronze dropped on steel previously brought to a welding heat will not chill before a union is formed. When the steel is dropped on bronze, unless the bronze is so highly heated that it is in danger of being burned, it chills the molten steel before it can effect a compact union.

As a last, but most important point, remember that metals of different conductivity as well as of different melting points require flames of different sizes.



The Automobile Repairman

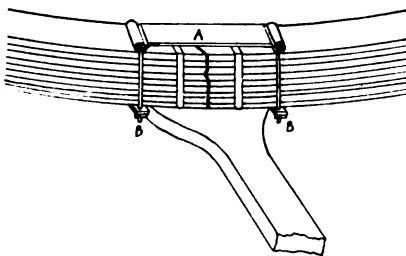
A leak around a rivet head in the bottom of the gasoline tank is an annoying leak and is a most exacting and unpleasant piece



time, if necessary, to insure a supply constantly in place, ready to help by its property of penetrating to the finest crevices. For bolts, nuts, shafts, hubs, collars, pins, keys, etc., this method is recognized as almost a panacea.

No work is dirtier harder upon their hands than automobile repairing. Grease and oil, combined with rust, fill the pores and it is extremely difficult to remove the accumulations from the hands, especially when the skin has become roughened and calloused. Much trouble and oftentimes discomfort would be eliminated if the mechanic avoided the most common methods of washing the hands, and paid some little attention to this important detail. If before beginning a specially dirty job the hands should be rubbed and the lines and pores filled with a good toilet soap there would be but little effort required in removing the dirt when the work was completed and the skin would remain smoother. A coarse, hard skin is harder to keep clean than a smooth, fine one, and the effect of the use of strong alkaline soaps, gasoline, sand soaps, etc., which remove the dirt so well, is to make the skin rough and scaly. Most repairmen use soft soap (such as is used for washing cars) and gasoline, because it is handy and also because it is cheap, which are strong arguments for such soap, but a handful of sawdust or bran saturated with kerosene would prove just as effective, would not be more expensive and would be less detrimental to the cuticle.

Before attempting to dismantle an engine, gear box or any other part of a car, it is essential that its construction should be fully known. If one goes at the task blindly, by removing all the nuts in sight without knowing just what effect the freeing of each one of the fastening devices will produce, the chances are that an unnecessary amount of work will be done and parts thrown out of relation which need not be disturbed. If a drawing showing exactly the way in which all parts are fastened together can be secured, five minutes' study of this will be worth more than half an hour with the spanner, removing nuts



A SIMPLE SPRING REPAIR

in a half experimental manner. If no such guide to the method of putting together of the mechanism is to be had, it is worth while to study the relation of the actual parts until there is no doubt as to the particular function of each bolt or other holding device, and as to what will happen when each is removed.

To repair a spring temporarily in an easy and efficient manner is illustrated in the engraving. The brace, A, is made the width of the spring and long enough to lay over the clips holding the springs to the axle, and to allow the ends, B, to be outside the axle. These ends should be about three inches long. This brace will effectually repair either a front or rear spring.

Doesn't it happen too often that some bolt, nut or other small part will slide out of the fingers into deep grease or oil or

some inaccessible part where you thought it could never get? And it isn't pleasant to pick it out of the grease or oil or easy to get it out of that spot. In such a case it is mighty nice to have a long bar magnet on hand and to poke that where you either don't care to or really can't put your hand, and draw the prodigal part back into the realm of cleanly accessibility. But who

follows, the cylinders are referred to by numbers; No. 1 being the front cylinder and No. 4 that near the dash.

To facilitate as much as possible the timing of the motor, marks have been stamped on the flywheel, indi-

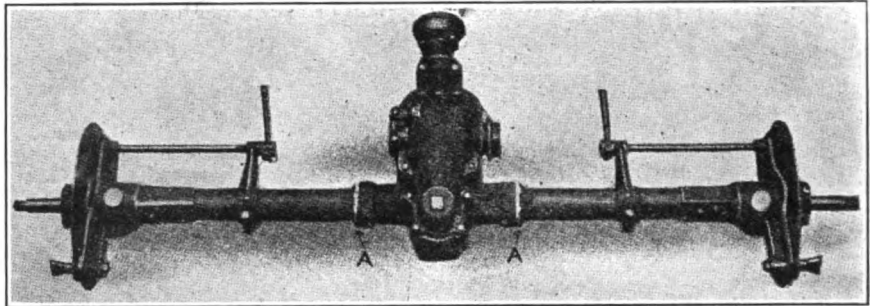


FIG. 7—AUTOMOBILE AXLE, SHOWING AT "A" HOW STEEL AND BRONZE CAN BE WELDED TOGETHER

carries a bar magnet around with him? you ask. If there is a magneto on the car you can easily make a magnet out of a screw-driver, file or any hardened piece of steel, by simply holding it against the "horse-shoes" for a short time.

If pliers are used in fitting or removing a stud in some part of the motor car mechanism they either damage the thread or the plain part of the stud. If the stud be tight and has to be removed, it is often impossible to do this by means of pliers. A better way is to use a pair of lock nuts which are run on the top side of the stud thread and locked up together, two spanners being used for this purpose. If the stud has to be removed, the bottom nut is then turned by the spanner in a direction counter-clockwise when looking on the top of the stud. If the stud has to be tightened, the top nut must be turned in the clockwise direction. Another method that may be employed when fixing studs in place is to use a rather deep nut with a setscrew; run a few threads of the setscrew into the nut, and then if the nut be screwed on the top of the stud and held by a spanner while the screw is run down to lock it, the stud may be run into place by operating the setscrew in a clockwise direction.

Timing the Valves of a Hupmobile and Adjusting the Cam Shaft Chain

The timing of the valves of a motor is usually somewhat puzzling to the average smith. The following directions and the accompanying engraving should make this work easy. The cam shaft and magneto are driven by a Coventry chain from the crank shaft. The sprockets bear a definite angular relation to each other throughout the entire cycle, and any alteration of this will, of course, necessitate what is termed the "re-timing" of the motor. In what

carrying the points of opening and closure of the valves. The flywheel marks are readily discernible by removing the transmission cover.

By the aid of engraving we will try to explain the method that must be followed in retiming the motor. It is first essential to have a mark on the case to line up with the flywheel marks. The easiest obtainable mark is to scribe one central with the case, as indicated at A. The first thing to do is to set the cam shaft—that is, to bring it into a certain relation with the crankshaft. Remove the valve spring cover on the side of the motor in order to see the movement of the tappets when turning the cam shaft. Now turn up the mark on the flywheel 1 & 4—I-O, until it coincides with the mark A scribed on the crank case. The mark 1 & 4—I-O, indicates that the intake is just beginning to open in No. 1 cylinder. Without altering the above position of the flywheel, turn the cam shaft by the fan pulley on the front of the motor until the inlet tappet on No. 1 just begins to rise. We now have the cam shaft in the exact relation with the crank shaft. Without moving either the cam or crank shaft, replace the chain. Next remove the breaker box or interrupter cover of the magneto. This will show the position of the breaker. Move the lever D to full retard—that is, all the way down. Move the flywheel until the mark B, 1 & 4—CL is two inches past the mark on the crank case A. At this point the interrupter should just begin to break at full retard, as



shown in the position C. If the interrupter is not in this position, loosen the nut on the shaft holding the magneto sprocket and turn the shaft around until this position is obtained. Also be positive that the distributor brush E makes contact with No. 1, taking care that neither crank shaft nor cam shaft revolve while setting magneto. This brush is easily accessible upon removing the distributor cover F. To do this, squeeze the springs G in against the magneto and, at the same time, pull off the cover. Having replaced all the parts properly and followed out the instructions carefully the motor is ready for operation.

Throughout the entire procedure, great care, together with a liberal supply of common sense, must be used. Never leave a greater space between the bottoms of the valve stems and the tops of the valve tappets than will just allow a very thin card or piece of paper to be slipped between.

Adjusting Cam Shaft Chain

The chain which drives the cam shaft and magneto may be removed by taking out the cotter pin in the detachable link and pulling out the link pin. Care should be taken to fully SPREAD the cotter after putting the chain together.

The chain should only be taken off when it is necessary to take the motor apart, for the motor must be retimed when it is put back.

The chain will stretch slightly and requires adjustment from time to time. It may need adjusting after say the first two thousand miles, after that it is not likely to need attention oftener than once a year.

To adjust, loosen the four nuts which hold the magneto, remove the shims H (see engraving) from on top the magneto plate, pull the magneto STRAIGHT up as far as it can be raised by hand, and insert as many shims as required to maintain this height under the magneto plate. Push the magneto forward as far as possible before tightening nuts, to prevent oil leaking from chain case around magneto shaft. BE SURE TO PUT IN AND SPREAD COTTER PINS.

DO NOT pry under the magneto to raise it, for you may get the chain too tight. The motor should turn over as easily after the chain is adjusted as before.

Chain is at proper tension when it does not sag between sprockets, but can be pushed in about one eighth inch at the middle of the vertical portion between crankshaft and magneto sprockets. This can be ascertained by removing the cover over the magneto sprocket, or the hand hole cover in the bottom of the oil pan.

A Unique Kerosene Carburetor

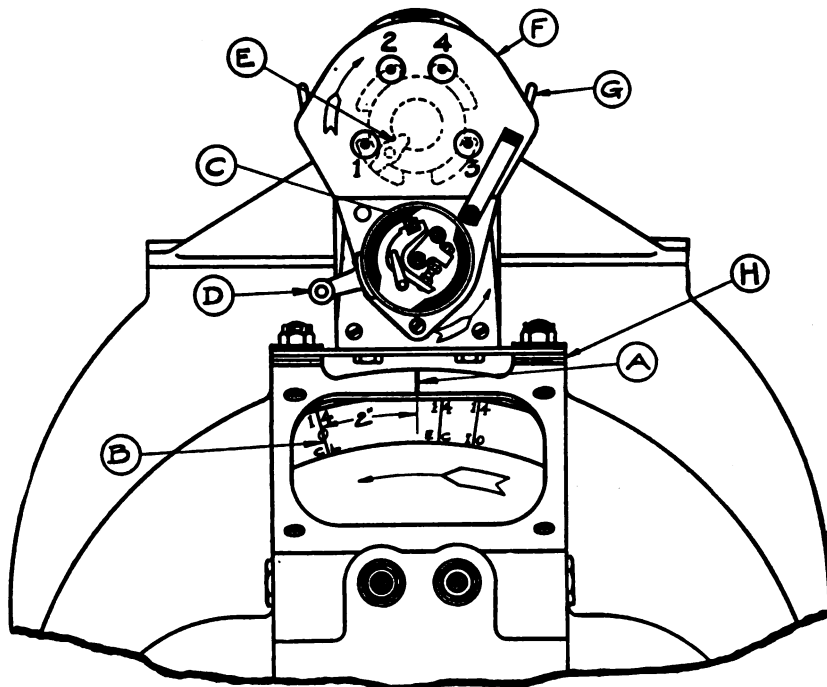
It is generally conceded by those who have acquired experience in the kerosene-carburetor field that the application of heat at some period of the travel of the fuel from the tank to the motor is necessary, says J. A. Lucas, in *Power*. The application of heat, however, must be carried out with extreme delicacy, for if there is

mixing chamber of the carburetor itself, doubtless appears revolutionary. Yet it is by this very process that Alexander E. Porter has succeeded in producing a kerosene vapor that differs widely from vapors formed by more familiar processes.

Preliminary Experiments

Before describing the construction of the apparatus it might be well to mention some of the preliminary results of its peculiar action.

While the carburetor is in actual service it is operated in the usual way by the suction of the motor. The experimental carburetor employed on the bench to demonstrate the principles of operation, however, is worked by compressed air, the office of which is to atomize the kerosene as the initial step in the process. The atomized kerosene (without the application of



TIMING THE VALVES IS USUALLY A PUZZLING JOB

insufficient heat the process of vaporization is but slightly furthered, while if there is too much heat a chemical action known as "cracking" takes place, the kerosene splits up into its components, and the result is poor combustion, an odoriferous exhaust and an abundant deposit of carbon in the combustion chambers and other parts.

To those familiar with the more conventional lines of endeavor that have been followed in many attempts to solve the kerosene-carburetion problem the idea of applying heat by starting a fire, so to speak, in the

heat) issues in a spray which will rapidly condense on the hand and drip off. The instant a flame is applied, however, under the proper conditions of mixture, the characteristics of the vapor are entirely changed, and it becomes a thick white vapor, strongly resembling steam, and the most interesting thing about it is that it is decidedly difficult to condense. It floats in the air like smoke and disappears in the same gradual way.

The pure vapor, close to the discharge pipe, cannot be ignited with a naked flame. Further out, however,



where there is an admixture of air, it can be ignited with a match, and burns with a reddish flame. It is notable, however, that the flame gives off no smoke and produces no deposit.

The same procedure in the case of the raw spray of kerosene results in the usual smoke and shower of small particles of black carbon in the air. The vapor is easily caught in a wide-mouthed bottle held over the discharge pipe of the carburetor, and, despite the coldness of the glass walls, remains visible in the bottle for 14 min. by the watch.

If a bottle of the white vapor is opened for a moment and a little air admitted, a match applied to the mouth will ignite the mixture, which will burn very rapidly and with a slight puff of flame, but without any deposit of carbon.

and various details, the kerosene enters through a float valve A into the chamber B, thence through the passage C to the needle valve D and passage E to the atomizing chamber F. Atomizing air is drawn in by suction through the passage G, past the needle valve H and up through I, where being directed against the jet of kerosene breaks it up into a spray. Air is also drawn in through the passage J past the needle valve K and up through passage L, thence through the annular holes M, as indicated by the arrows, and into the atomizing chamber F.

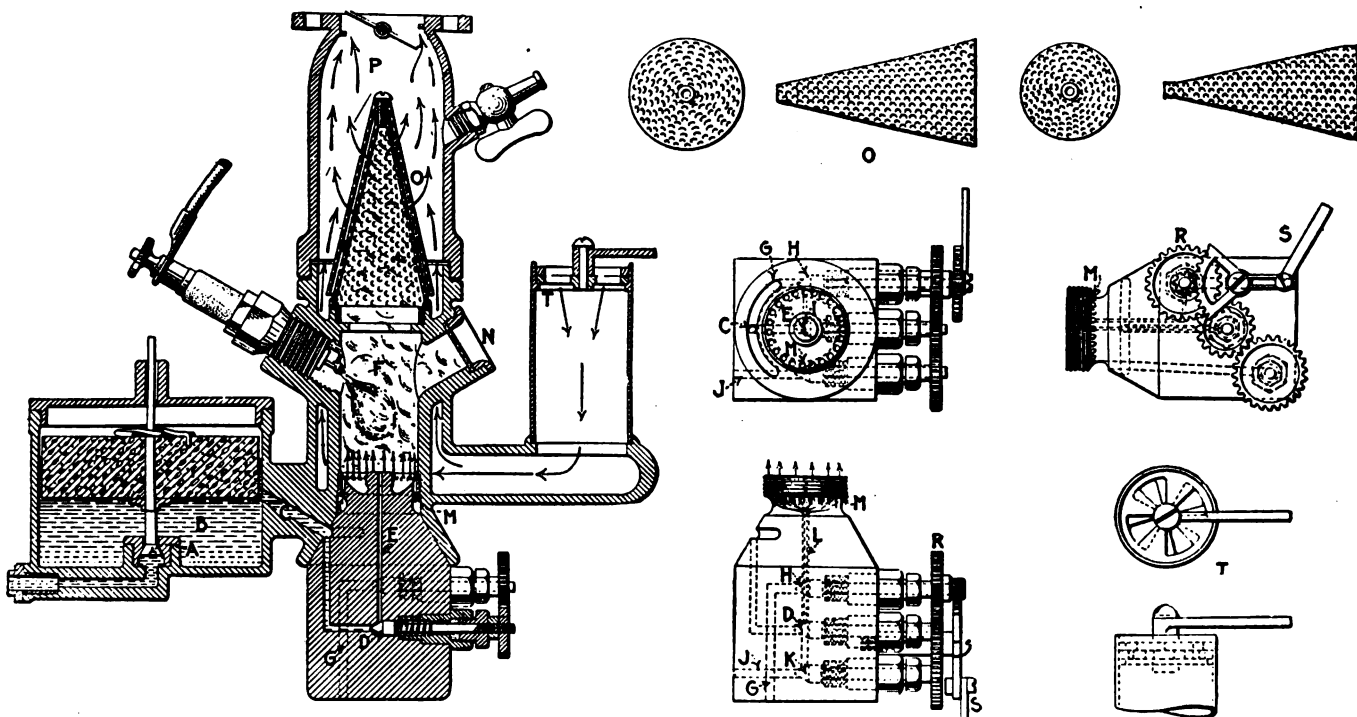
The spark plug ignites a small portion of this atomized kerosene mixture which burns as a small ball of fire and may be seen through the mica window N. The screen O prevents any flame from extending to the upper part of the carburetor. A

and K, which are connected through gearing R (maintaining a constant ratio), the movement being controlled by a lever S, which operates in unison with the throttle.

The auxiliary air for supplying the proper mixture to the engine cylinders enters through the sliding throttle T, and up into the mixing chamber P, as indicated by the arrows.

The spark plug is operated from an independent spark coil with a switch on the dash, and after the carburetor has been in operation a few minutes the current may be turned off and the ball of fire will continue to burn in chamber F and the carburetor will work as usual for a long period.

The motor starts, when cold, on the kerosene, apparently as easily as on gasoline. There is this difference between gasoline and kerosene, however:



SECTIONAL VIEW AND DETAILS OF THE PORTER KEROSENE CARBURETOR

The conclusion naturally drawn from these demonstrations is that by this method it is possible to produce a kerosene vapor that is sufficiently stable to withstand condensation considerably longer than is necessary to get it into the cylinders of a cold engine and ignite it. Furthermore, it would appear that under normal conditions combustion should take place without smoke or odor and without leaving deposits in the cylinders.

Referring to the illustration, showing a section through the carburetor

single screen was first tried, but this was found to heat up after a few minutes and ignite the vapor in the upper chamber. The double screen, however, prevents this.

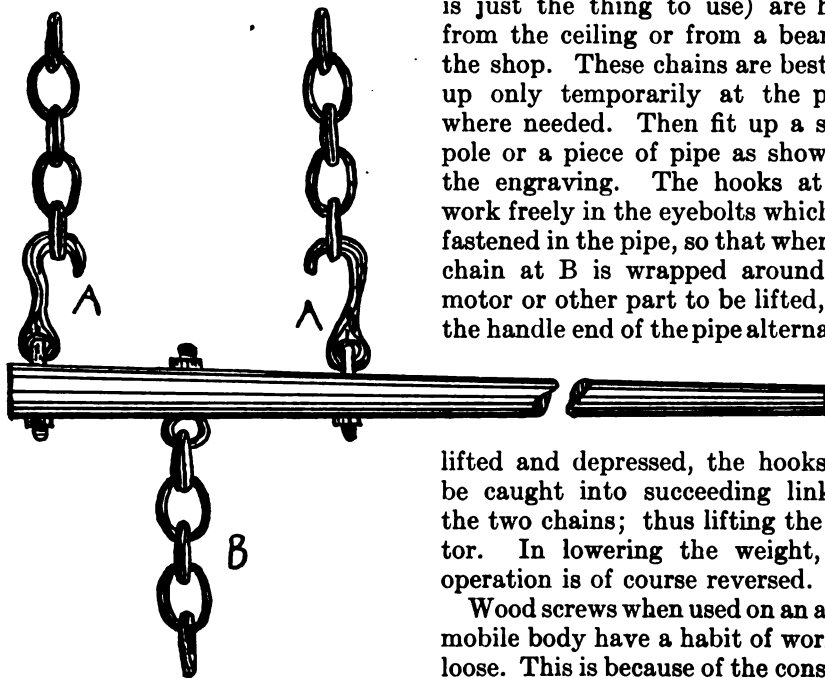
Because of insufficient air in the chamber F only a very small portion of the kerosene burns, and furnishes just enough heat to break up the remainder into the form of a dense white vapor as previously mentioned. The proportions of air and kerosene entering this chamber are controlled by opening the needle valves, D, H

Judging from the running of the motor, the kerosene burns more slowly than gasoline, there being apparently more gradual expansion and less of the explosion effect. The correctness of this would seem to be borne out, in a measure at least, by the fact that the motor will throttle down to a lower speed than with gasoline and will "hang on" when climbing a grade on high gear in a way that is rather surprising. While the speed of combustion is quite sufficient for all ordinary purposes, when



a motor is raced to an excessive speed the power falls off sooner than with gasoline.

No trouble has been experienced from deposits in the cylinders or on the spark plugs except when the flame



A SIMPLE WEIGHT-LIFTING DEVICE

in the carburetor has been momentarily extinguished and raw kerosene vapor has been drawn in.

The vapor at the point of combustion is too rich to burn rapidly, burning beyond the screen is impossible, and a backfire from the motor would have a tendency to extinguish the flame, momentarily. Hence, there is no danger from the flame.

Most of the road test work with this kerosene carburetor has been with a large and heavy six-cylinder car, which is notoriously wasteful in the matter of fuel consumption, and the manufacture of which has been discontinued. The motor is rated at 60 H. P. Running on gasoline the best average that could be made was five miles to the gallon of fuel. On kerosene with this carburetor the average rose to 10.5 miles per gallon, and the motor showed an appreciable increase in power, especially on hills.

Practical Hints for the Practical Automobile Repairman

A. J. SHANNON

Many smiths have no weight-lifting devices in their shops, and when called upon to overhaul a car

have difficulty in lifting out the motor. The device illustrated in the accompanying engraving is simple, low in cost and yet is very serviceable in lifting out motors or raising other heavy parts. Two chains (trace chain is just the thing to use) are hung from the ceiling or from a beam in the shop. These chains are best put up only temporarily at the point where needed. Then fit up a stout pole or a piece of pipe as shown in the engraving. The hooks at AA work freely in the eyebolts which are fastened in the pipe, so that when the chain at B is wrapped around the motor or other part to be lifted, and the handle end of the pipe alternately

lifted and depressed, the hooks can be caught into succeeding links of the two chains; thus lifting the motor. In lowering the weight, the operation is of course reversed.

Wood screws when used on an automobile body have a habit of working loose. This is because of the constant jar and vibration of the car. To prevent these screws from working out of place it is a good plan to file through one end of the head below the screwdriver slot. Then, after turning the screw into place tightly, drive a small brad through the filed part into the wood. A nail set will enable you to drive the brad below the surface of the screw head.

The location of a radiator leak is sometimes very difficult, because of the tendency of the water to flow over the surface of the metal tubes of the radiator. This is especially true if the leak is small, as the water will ooze out rather than spurt. To find a leak of this nature, blow smoke into the emptied radiator. This will quickly show where the leak is. To blow smoke into the radiator, take a well-lighted pipe, blow through the bowl of it and connect it to the radiator opening.

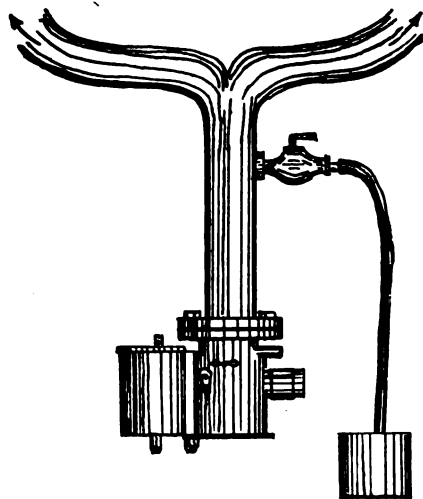
A simple method of removing carbon, and for which any practical smith can fit any car, is as follows: Drill a hole into the fuel manifold and tap it for a small petcock, as shown in Fig. 2. When it is desired to remove the carbon from the cylinders, attach a piece of rubber tubing to the petcock and place the free end of the tube into a small can of kerosene. Now start the motor in the

usual way, with the little petcock closed. When the motor is running steadily shut off the gasoline gradually and turn on the petcock until the motor is running entirely on kerosene. Allow motor to run on the kerosene for fifteen or twenty minutes if it will. If difficulty is experienced in getting the motor to run on kerosene, switch to gasoline and then to kerosene several times; letting the cylinders draw in kerosene each time until the carbon is removed. This little arrangement will allow the motorist to do his own carbon removing, and you should be able to turn a good bit of extra profit into your own pocket on jobs of this kind.

Professor Gay on The Horse and The Motor

In his new book, "Productive Horse Husbandry" (see review in New Books), Professor Carl W. Gay devotes an entire chapter to a discussion of the "Motor as a Factor."

Prof. Gay is Professor of Animal Industry in the School of Veterinary Medicine at the University of Pennsylvania, also Director of Horse Breeding for the State of Pennsylvania, so that he is well qualified to speak on any subject connected with the horse; and while one would naturally expect a man with interests so almost entirely wrapped up in the



TO REMOVE CARBON FROM THE CYLINDERS

horse to be rather partial in his views, his review of the motor as a factor to be reckoned with by the horse interests is decidedly fair and logical.

We quote extracts of Prof. Gay's chapter on "The Motor as a Factor."



At no time in history has the horse been subjected to such keen competition for place and favor as at the present.

The motor is such an important factor as to require consideration in any discussion of equine affairs. The viewpoint, however, should be fair and logical, not obscured by such sentiment or enthusiasm as characterizes a partisan review of either side of the question. There are ardent motorists who would have the horse annihilated for all time, while some riders and drivers would legislate the same end for all motordom; yet neither of these positions is warranted by the facts.

Other Factors

History is but repeating itself, apparently, as in the case of the invention of gunpowder, the advent of canals and, later, railroads, the adoption of the cable and the trolley on street railways, and the past popularity of the bicycle, each of which in turn threatened to supplant horses in their different fields.

Advantages of the Motor

An analysis of the situation at present concedes to the motor three distinct advantages over the horse: Speed, endurance (especially in hot weather) and vogue. Whenever the miles covered or the time consumed is the sole consideration it is reasonable to suppose that the motor will be shown the preference. So it is in the case of the doctor or the sales solicitor, men whose earning capacity is limited by the facility with which they can get about, likewise the traveling public and society folk have become so accustomed to a minimum time allowance for making trains or keeping engagements that they could hardly be expected to dispense with the taxicab or limousine. Suburban deliveries are made much more expeditiously by auto when they entail long, straight-away runs with few stops; and the moving of large loads to a distant distributing point can be more quickly and cheaply done by the big motor trucks than by railroad freight.

Advantages of the Horse

For the about-town delivery of many small parcels, each one to a different house, requiring almost continuous starts and stops with frequent runs in and out of short streets, the auto deliveries are more costly and less efficient. Horses have their routes and lend their assistance in anticipating stops and starts, or even turning around themselves and waiting around the corner while their driver resorts to a short cut across lots.

Whenever much time is spent in standing or waiting, the advantage is with the horse-drawn vehicle on account of the smaller investment represented and the less depreciation involved.

Cost of Feed and of Gasoline

Clever motor salesmen have taken advantage of the abnormally high cost of horse feeds for the past few years in their calculations of the relative economy of horse-drawn and motor vehicles. But with feed inclining again to a normal level while the cost of gasoline is advancing at such a rate as to threaten automatically to check the patronage of the motor unless other fuel or motive power is resorted to, there is little weight in such arguments.

A Motor Age

There is every evidence of this being a motor age; the motor idea is conspicuous in our mode of dress; it predominates in our conversation. Whereas the small boy of past generations straddled the broomstick or harnessed two overturned chairs and

played horse he now turns his ingenuity to the construction and operation of racing pushmobiles of the latest type and full equipment; patrons of the remnant counters demand that the goods purchased by them shall be delivered by auto, in case the firm is so derelict as to still retain some antiquated specimens of the genus *Equus* in their delivery service. All this is fully appreciated by those engaged in the business of catering to public patronage and it is played upon in every possible way by the auto salesman.

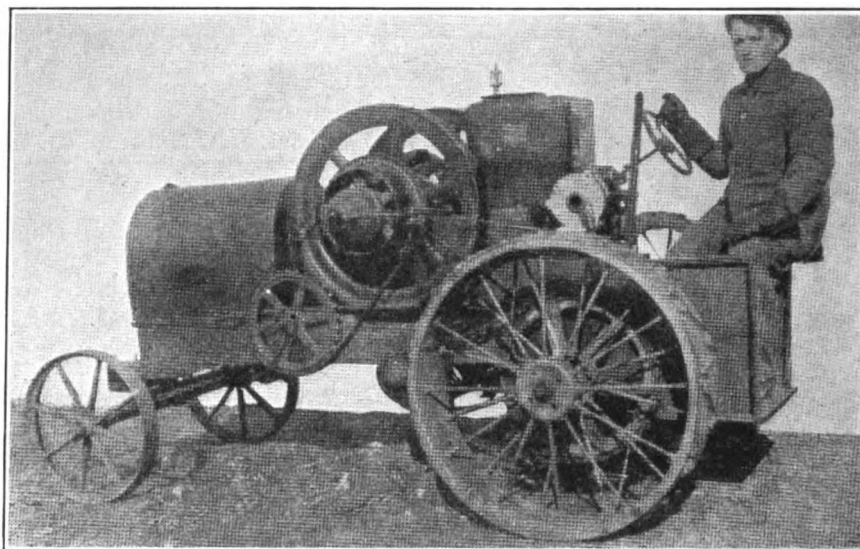
Vogue gives to the automobile, however, a much less stable advantage over the horse than does its greater efficiency in long, fast runs. Popular favor is self-limiting, and the stronger the wave of general popularity the harder the brakes will set. The pace-makers of fashion are the ultra-exclusive set; as soon as a fad which they have started gains sufficient momentum to reach the butcher, the baker and so on, it is considered common and is dropped by the very ones who first became sponsors for it and their

in a kindred relationship. The commercial truck, also, performs so many lines of service so much more acceptably than the horse ever can, that its supremacy within limits cannot be denied. Yet in this the motor is supplementing, not supplanting, the horse in service.

Demand for Saddle Horses

It may seem like overdrawn optimism to attribute to the automobile any advantages accruing to the horse, but such is not difficult of demonstration. The motor car has been a most important factor in the prevalent country life movement. Distances are so contracted by its use as to place the country within easy access of many who could not otherwise enjoy it. The country without a horse is like a library without books. Fox hunting is becoming the sport of a greater number of people in this country each season, partly, at least, on account of the rapid transit facilities offered by the automobiles.

There are more people riding today on doctors' prescriptions than ever before.



TRACTOR MADE FROM PARTS OF OLD FARM MACHINES

example is invariably followed. The remarkable increase in the number of cars used each season, together with the great variety of individuals enlisting in the ranks of the motorists, suggest that we are rapidly approaching the crest of the wave.

The horse markets, shows, park drives and bridle paths offer substantial evidence that the horse is being gradually reinstated, not in his former capacity, perhaps, because the automobile has modified uses and customs, but in greater favor than ever so far as some types are concerned. If the activities of the motor road monopolists were properly regulated, both as to the construction and use of roads, a preference for the horse would be shown by many drivers who have been forced off the road by fear of fallen horses and collisions.

With the present vogue abated, the motor will become, no doubt, a cold business proposition which facilitates affairs in such a multitude of ways as to be indispensable, like the telephone.

Supplements to the Horse in Service

The roadster, the touring car and the limousine have all added so much to our possibilities in their respective fields that they must be included in every completely equipped establishment, but there is nothing to render them incompatible with the horse

The convenience of the auto has removed the necessity for even a physiological amount of exercise, which must be compensated for in some other way. Thus, while no doubt depressing the market for coach and road horses, the automobile has furnished a boom to the saddle horse trade.

There is a sentimental side to the subject under discussion. Motor possibilities have left horses, except those in the commercial field, chiefly in the hands of people who want them because they are horses, with the result that they are in their highest estate, a condition most satisfactory to them and most gratifying to those interested in their well-being. No one who cares for horses regrets either the substitution of the taxicab for the horse-drawn hansom or four-wheeler, or the transference of the ordinary livery patronage to the garage. He who rides only for the thrill would confer a favor on horsekind by devoting himself to aeronautics.

Better Breeding of Horses

Finally there is an economic significance to the whole situation. Competition stimulates to best efforts. Now the consumers of horses are discriminating; demand is for horses of the highest type. It has been observed that after an experience in buying and maintaining automobiles in service



one becomes more appreciative of horse values and more liberal in his allowance for cost. The result will be more intelligent and systematic breeding for a definite purpose, with consequently less failures and, finally, a more liberal profit to him who meets the demand of those who can afford to discriminate and pay well for what they require.

A Home-Made Tractor

There is no reason why the blacksmith cannot build an occasional tractor to sell to his trade or to rent at so much per day or to loan. To show what can really be done in this line we reproduce an engraving of a home-made tractor built by a farmer from odd machine parts. Mr. Frank Skinner describes this machine, in *Gas Power*, as follows:

Being greatly interested in the gasoline engine and the many uses to which it is being put, both by the technical mechanic and the man who is just mechanically inclined but has never had the advantages of schooling along technical lines, I am always on the lookout for anything of merit along this line.

A friend of mine in Iowa has built from parts of old machines picked up around his place, the home-made tractor which is shown in the enclosed photograph. He has built it for his own use, and it is doing many small jobs about the farm which were formerly done by more laborious and expensive methods. The drive wheels were taken from two Deering binders, and the front wheels of the tractor were the truck wheels of the binder. It is equipped with cog gearing, the

differential being 18 inches, which was obtained from the gearing of the two old Deering binders. The main gear wheel was taken from an old stone derrick. The transmission wheels were furnished by an old mower and a hay loader. The equipment includes a clutch, as will be seen by the photograph, which permits of starting and stopping easily and slowly as desired. It has but two speeds, one forward and one reverse, and has a road speed of about 3½ miles per hour.

The engine is a 5 H. P. which, of course, is too light for doing any field work, such as plowing, discing and seeding, but it does furnish sufficient power for hauling a ton of coal on good roads, and smaller loads of produce on a farm wagon to and from town. It is used for sawing wood, unloading grain, grinding feed, and the many small hauling jobs about the farm. It is easily belted to any power operated machine.

The design is unlike anything else ever built and gives entire satisfaction. Its cost was, of course, very slight, as the maker did all the work himself and there was no cost for the different parts used in its make-up.

Adjustments on the Ford and How to Make Them—2

To Assemble Transmission

With the transmission shaft, 3331, Fig. 3, in place, turn the flywheel

face downward, so that the shaft will be in a vertical position.

Then assemble the following parts in a separate group, proceeding as follows:

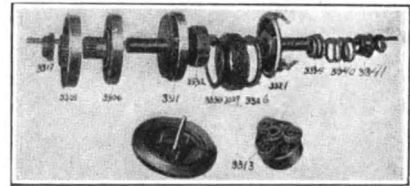


FIG. 3—THE FORD TRANSMISSION SHAFT

Place brake drum, 3311, Fig. 3, on table with the hub in a vertical position; place the slow speed plate, 3306, over hub with gear uppermost; then place reverse plate, 3301, over the slow speed plate so that the reverse gear surrounds the slow speed gear; fit the two keys, 3318, in hub just above slow speed gear; put the driven gear, 3317, in position with teeth downward, so they will come next to slow speed gear. Next take the three triple gears, 3313, and mesh them with the driven gear, according to punch marks on the teeth, the reverse gear or smallest of the triple assembly being downward. After making sure that the triple gears are properly meshed, tie them in place by passing a cord around the outside of the three gears; then invert this assembled group over the transmission shaft and place in position so that the flywheel pins will pass through the triple gear. This will bring the brake drum, 3311, on top, in position to hold the clutch plates, etc.

The next step is to fit the clutch drum key, 3333, in the transmission shaft. Press the clutch drum, 3332, over shaft, and put setscrew, 3334, in place to hold the drum. Put distance plate, 3330, over the clutch drum, then the small thrust plates, 3328, alternating with the large plates, 3329, until the entire set of plates is in position; making sure that the large thrust, 3329, is on top. If the small plate is on the top, and you throw your motor from high speed into low, the small plate is liable to fall over the clutch drum and you will be unable to throw motor back into high. Then put the clutch push ring, 3336, over the clutch drum with the three pins projecting upward, and lastly bolt the driving plate, 3321, in position.



A VIEW IN MOTOR ASSEMBLING DEPARTMENT OF A MODERN PLANT



so that the adjusting screws of the clutch fingers will bear against the clutch push ring pins.

Before proceeding further it would be a good plan to test the transmission by moving the plates with the hands.

The clutch parts may be assembled on the driving plate hub as follows: Slip the clutch shift, 3344, over the hub so that the small end rests on the ends of the clutch fingers. Next put on the clutch spring, 3340, placing the clutch support, 3341, inside so that the flange will rest on the upper coil of the spring. Next place clutch spring thrust ring, 3343, with notched end down, and press in place—inserting the pin, 3342, in the driving plate hub through the holes in the side of the spring support. The easiest method of compressing the point necessary to insert the pin is to release the tension of the clutch fingers by means of the adjusting screws. When tightening up the clutch again, the spring should be compressed to within a space of two or two and one sixteenth inches to insure against the clutch spring slipping. Care should be exercised to see that the screws are adjusted so the spring is compressed evenly all around.

To Adjust Crankshaft Main Bearings

If the engine "knocks" when suddenly thrown into high speed or when pulling up a stiff grade—the spark being properly timed and combustion chamber free from carbon—it is probable that the main bearings require adjustment. For

the benefit of those who are not thoroughly familiar with the procedure necessary to correct trouble of this nature we offer the following directions:

1. Remove the three babbited caps and clean the bearing surfaces with gasoline. Apply Persian blue or red lead to the crankshaft bearing surfaces, which will enable you when fitting the caps to determine whether a perfect bearing surface is obtained.

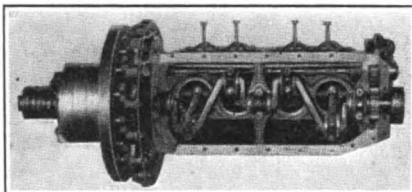


FIG. 4—BOTTOM VIEW OF MOTOR—
CRANK CASING REMOVED

2. Place the rear cap in position and tighten it up as much as possible without stripping the bolt threads. When the bearing has been properly fitted, the crankshaft will permit moving with one hand. If the crankshaft cannot be turned with one hand the contact between the bearing surfaces is evidently too close and the cap requires shimming up, one or two paper liners usually being sufficient. In case the crankshaft moves too easily with one hand, the shims should be removed and the steel surface of the cap filed off, permitting it to set closer.

3. After removing the cap, observe whether the blue or red "spottings" indicate a full bearing the length of the cap. If "spottings"

do not show a true bearing, the babbitt should be scraped and the cap refitted until the proper results are obtained.

4. Lay the rear cap aside and proceed to adjust the center bearing in the same manner. Repeat the operation with the front bearing, with the other two bearings laid aside.

5. When the proper adjustment of each bearing has been obtained, clean the babbitt surface carefully and place a little lubricating oil on the bearings, also on the crank, then draw the caps up as closely as possible—the necessary shims, of course, being in place. Do not be afraid of getting the caps too tight, as the shim under the cap and the oil between the bearing surfaces will prevent the metal being drawn into too close contact. If oil is not put on the bearing surfaces the babbitt is apt to cut out when the motor is started up before the oil in the crank case can get into the bearing.

To Adjust Connecting Rod Bearings

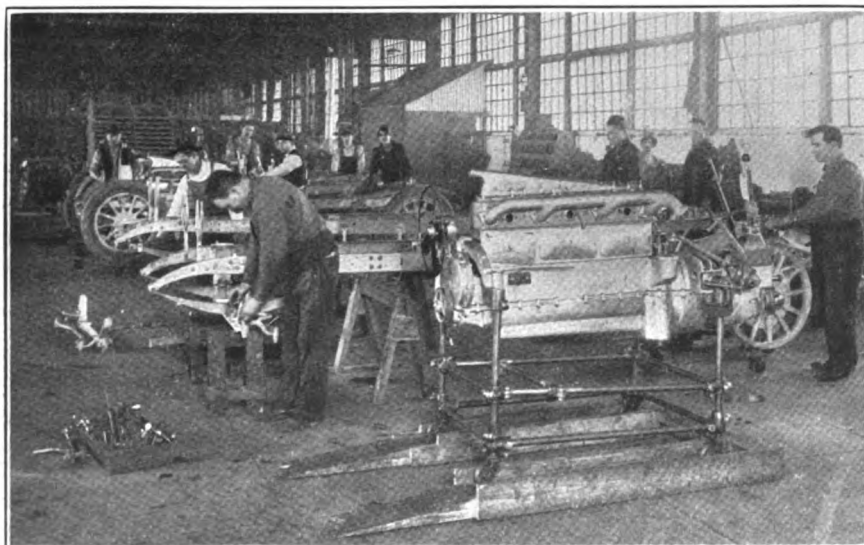
Remove connecting rod cap and draw-file the ends until the cap when drawn up tight by the connecting bolt is a close fit on the crankshaft. The bearing should be just tight enough so that the connecting rod will barely turn of its own weight when inclined at a horizontal position. When all of the bearings have been fitted it should be possible to move the crankshaft with both hands. Remember, there is a possibility of getting the bearing too tight, and under such conditions the babbitt is apt to cut out quickly unless precaution is taken to run the motor slowly at the start. It is a good plan after adjusting the bearings to jack up the rear wheels and let the motor run slowly for several hours (keeping it well supplied with water and oil) before taking it out on the road.

Thoughts on Timely Topics

By THORNTON

Caustic Censure and Cheery Comment

THEY SAY MUSIC HAS A QUIETING EFFECT on the savage heart or liver or whatever other organ of their anatomy contains their bump of musical appreciation. Anyhow, why wouldn't it be a good idea to play a few strains on a mouth organ or an



VIEW IN AUTOMOBILE PLANT—NOTE THE MOTOR STAND IN FOREGROUND



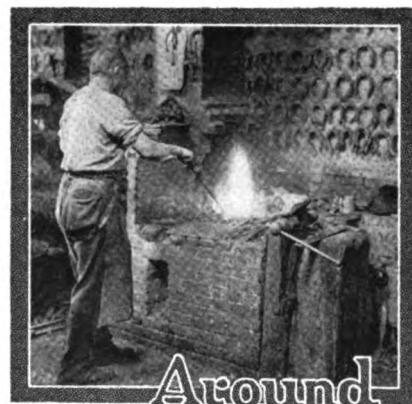
accordion for the edification of the occasional savage animal that you shoe? Or, if you cannot perform creditably upon one or the other of these instruments, put in a piano. One of these electric, self-starting, loud-sounding ones should prove just the thing. And a collection of records, from the "Anvil Chorus" to "The Wishing Well," should equip you for every emergency. Certainly, if the old saying is true about the soothing-syrup qualities of music, the average shoer can lay aside his well-worn axle handle with which he has been in the habit of currying the sides of an obstreperous horse, and put in some time cultivating a taste for Beethoven and Wagner.

AND NOW THAT WE'RE EDGING ALONG toward spring, don't forget your spring cleaning. We remember once some neighbors of ours forgot about their spring cleaning, and it took them years to catch up. You see, they were so busy they didn't notice the time, and it was years before they could get to thinking straight about the number of the year. And when a person misses a year you can't, of course, expect him to be the same. And while we're on this cleaning subject, don't get so blamed busy cleaning up that you can't find time to wait on an occasional customer. And another thing—if you get to moving and changing machines about don't get in the way of a toppling anvil or try to catch a falling stock rack. A chap we knew tried the last-mentioned stunt one time in a shop where we worked in the early days. This rack was a double sided affair in the middle of the shop. It had been there for goodness only knows how long and was getting rather shaky. Well, this particular day the rack was somewhat heavily stacked on one side and it started to come over and, just as it started, a new shop recruit happened along and attempted to hold the side up. The rack held long squares and rounds and, when we picked up the bars and what remained of the rack, the shop recruit looked as if he had been squeezed between the lids of a bread toaster.

THE SMITH WHO TRUSTS A FARMER for six months and is then requested to pay cash for a bushel of potatoes purchased from the Son of the Soil had best get into some other game—marbles or something else. There

seems to be a very popular notion about it being necessary to wait a long time for your money when you do business with a tiller of the soil. But when it comes right down to real kale the humble, horny-handed son of the harvest has more of the long green tucked away than you can blow with one of them there new 14-inch No. 200's. The next time one of these plow-pushers comes squealing that "heads-you-pay-cash, tails-you-trust-me" gag, just grab him by the chin strap and let him have a piece of your mind.

'STEAD OF BLUSTERING AND BLOWING about your hard luck you had better thank your lucky stars that you're in the smithing business and have to work for a living. Honest work makes honest appetites, and an honest appetite with a cold potato is a better meal than a seventeen-course dinner with a digestion that is out of whack. And we don't ever remember coming across more than two real blacksmiths that complained of not being able to chew and digest anything from restaurant pie to boarding-house steak. And the two exceptions complained of stomach trouble, because their copper bottomed, harveyized, digesting apparatus had after years of abuse finally succumbed to the evil influences of rot-gut and other wet goods. And while we're on the subject we want to say that we don't know of a thing that will so thoroughly dull a man's appreciation of good, solid, home cooking as the continued bombarding of his stomach with strong liquor. It will burn the lining out of the inner man about as neatly as a gasoline torch will take the color off the side of a top wagon. But to get back to the subject—you know it's a pretty good thing to be able to appreciate good food, and if you have a digestive motor of good horsepower with a self-starting appetite attachment there is very little the matter with you and the whole world will look pretty rosy. It's usually some kink in our fuel system that causes things to appear off color—little petty things that seem to worry us most can usually be traced to some disarrangement of our functional apparatus. So thank God you've got work to do, with enough of it to keep your appetite healthy, your digestion good and your stomach fully appreciative of the things you put into it.



Around Our Forge Fire

The Blacksmith

Inquiry into the private life of the blacksmith—the blacksmith who is a real factor in the field of smith work, the blacksmith who is worthy of the name of smith—will show that the craft of smithing is dominated by men who are morally, personally, religiously, physically and intellectually the equal and in many cases the superior of many tradesmen usually considered above the plane of the blacksmith. There are just as many, if not more, smiths who can and do quote Scripture, as there are grocers, drygoods merchants or bank presidents. There are just as many if not more smiths who can quote Shakespeare, as there are jewelers, confectioners and dentists. Yet the great majority of people do not consider the smith the equal of these men, though he often receives more money in salary than the watchmaker, often lives in a better home than the doctor, often is a better citizen than the lawyer.

There are bankers who will find it hard to even get St. Peter's attention on Judgment Day, and there are blacksmiths who are Sunday School superintendents. There are doctors whom the average man is only too glad to pass without a nod of recognition, and there are blacksmiths whom everyone is glad to shake by the hand and call friend. There are merchants who are praised for their business ability, who are rich and are growing richer on the wages not paid to their help, and there are blacksmiths who unseen and unappreciated by many, are doing a world of good for humanity.

Why, then, this idea harbored by the majority of people? Why do most people usually consider the smith generally below the plane of the other business men, the craftsmen, the professional men? Is it because the smith works with his hands?—though he often uses his brains more than the average banker. Is it because of a dirty hand and face?—though he seldom has a heart as black as some lawyers. Is it because of his place of business?—though it is, in its most littered condition, cleaner than some business places located on the world's most talked-of thoroughfares.

Men—followers of Tubal Cain—disciples of Vulcan—you have nothing to be ashamed of—you have nothing to cover up—you have nothing to make excuses for as far as your craft is concerned. As far as your craft—founded centuries ago—is concerned, you should be the proudest workers on God's green earth. The anvil ring of Tubal Cain comes floating across the ages to prove the heritage. The clang of Vulcan's mighty blows roots the craft deep in the minds, in the history and in the legends of the centuries. Why then be ashamed?

A Modern "Hoss Shift"

W. O. B.

(With apologies to Holman Day)

Holman Day's "A Yankee Hoss Shift" was originally published in *The Saturday Evening Post* a number of years ago. The following verses are an attempt at word-picturing a similar incident in which the sons of the original "Yankee Hoss Traders" participated, with modern "hosses."

Sile Bangs' son was in town one day,
When Zeke Haines' Hugh ses: "Al, I say,
How's thet car y' bo't las' week?
Hear a swap is what y' seek.
I got a car I think I'll trade.
Seems t' me terms be easily made."
"Wal, I dun-no," says Al. t' Hugh,
"I'm pretty nigh suit on my naught-two.
Ain't no hand at swappin' a thing—
But, if you want, I will, by jing!"

"Wal, I ain't hankerin' arter a shift"
Ses Hugh t' Al, when he see the drift
O' Bangs' son's smart swappin' talk.
An' it seemed es tho' both sides'd balk.
But then Hugh ses, kind o' careless like,
"I merely tho't a trade y'd like.
Y' can't say thet I'm dyin' t' trade,
'Cause thur ain't no flaws in what Pierce
ever made."

T' this, Al. sed, with an awful rind,
"O' course I ain't the bluffin' kind.
If y' want t' trade, why I agree;
State yer terms an' then we'll see."
"Now yer talkin'," ses Zeke Haines' Hugh,
"But the terms I think be up t' you.
Y' hev yer say an' then I'll talk.
Y'll never hev cause t' hem er balk."

"All right," ses Al. (ol' Sile Bangs' son),
"I'll tell y' how this order be done.
I've got jus' enuff red sportin' blood
T' see sum tradin' that order be good.
I'll swap y' cars, sight unseen,
An' a lyin' trade ain't what I mean.
I'll tell y' 'bout the bus I own;
Then y' tell o' your'n, but let lies alone."

"Thet suits me right down to a T,"
Ses Sile Haines' boy—"I'm glad t' see
Y've got the same idee I got
About a-givin' the lies the drop.
So if y'll tell about yer car,
I'll tell about my own, by gar,
An' I jus' know you will agree
Thet sum t' boot should come t' me."

"Why, boot, Hugh Haines, should come
t' other way;
Y' don't get a Packard every day.
This car o' mine 's jus' had a test
Thet generally gits the finest an' best.
Y' know Bull Hill, down near Euclaire,
When it comes t' hills my car's right there.
It ain't a nineteen-fourteen car,
But a Packard's a Packard everywhar."

"Wal, mine's a Pierce," chimes in Hugh
Haines,
"Y' know the Pierce is built with brains.
An' while I *should* hev' boot t' trade,
I never back down when a deal is made.
Thet car o' mine is not high-powered,
But I've seen it stick ('tain't no coward)
'Long side o' thet "ninety" o' Mr. Prime.
For an hour er more, time after time."

"Done" said Al. Bangs, with a shout o' joy,
"I 'gree t' the shift, now whar's yer toy?
An' we mought es well tell the special out,
A'fore we deliver, don't y' think we mout?"

"Wal," grinned Hugh Haines, "thet Pierce
o' mine
Is in the shop o' Sidney Prime.
A'standin' next his car y'll see
A Pierce o' the vintage o' nineteen-three."

"An mine," laughed Al., "went fine until
It hit the ditch goin' down Bull Hill.
It's up thar yit—an's one o' a few
O' the Packards built in nineteen-two."



Heats. Sparks. Welds

There doesn't seem to be any closed season for the killing of time.

Spring work requires plenty of spring work—are you springing this spring?

A good driver of nails is not necessarily a good driver of business.

The man worth while is he who doesn't lose sight of the "fortune" in misfortune.

The days are growing longer. Does the work increase with them?

Don't be afraid to use the other fellow's ideas—but use them well.

Some smiths seem to think that they have to knock their competitor's business in order to boost their own.

Yes, there is one chap who is worse than the quitter—the fellow who's afraid to begin.

'Twould seem, from the amount of hammering that smiths do they would make good knockers—but every knock's a boost.

Doing business without advertising is like walking without shoes—it's pretty tough going.

Every page in "Our Journal" is here for a purpose. Better go through it again—there are profit opportunities in this issue.

Another milestone has been passed on the road of time. Are you striving harder to the next one?

The world owes everyone a living. But, remember, 'tis just a business world—and it only gives for value received.

Most any man is worth a dollar and a half a day below his neck—above his eyes lie the money-making powers.

Men of iron! consider well the "iron men." The iron men of silver and paper are your real excuse for being men of iron.

It's not so much the seizing of great opportunities that makes for success, but the seizing of any opportunity that presents, and making it great.

That person who is always telling you how to run your business, generally can't tell himself how to run his business—he hasn't any.

A man who is ashamed of his business is likely to have a business of which he should be ashamed. Make your business ashamed to stay in its present quarters—and make the other smith ashamed of his business.

Throw out the trash and truck that you've been saving for goodness only knows how long. A good time is right now when spring is in sight. Get right at the inside and outside scrap heap and clean up right. Save out what is really good, sell what you can, but do throw out what is absolutely worthless.

Get busy now on the automobile proposition. If you do auto repairing now, tell us about it. Read "Timely Talks" and see how easily you can land a couple of U. Samuel's real dollars by simply telling how you did something in your own shop. We want articles on automobile work, repairing, overhauling and general fixing. And we'll pay for 'em, too. So get busy.

And while you're cleaning up, this spring, clean off those patent medicine and tobacco signs that almost hide the shop. You can make more real money by putting up your own signs on your own shop than the little stipend you get from the medicine and tobacco men. Take them down and keep them down, and then ask folks what they think about it.

Efficiency is not strenuousness. The man who hustles may or may not be efficient; probably is not. Hustling is not a normal element in efficiency. You work at the forge while the stock you are welding is ten feet away. This means strenuous but not efficient labor. To work with your material piled so near that you can get it without moving is less strenuous but far more efficient.

The price of efficiency is eternal vigilance. Every man must be his own watchdog, and his first duty should be to bark at himself. A lot more would like efficiency if it did not interfere with their own ways. How angry the smith to whom a friend said that the improvement in his shop methods which he sought, must begin by radical changes in his own conduct. Don't try efficiency on "the dog," try it on yourself!

Tell Your Customer:

Not to give medicine to a horse or any other animal through the nose—it's unnatural.

Not to forget the horse's harness. An occasional cleaning makes life easier for the animal.

Green food is good diet for the ailing horse. Let him have it freely when out of sorts. Carrots are excellent, and mixed with bran and oats make a good appetizer.

Co-operation is the success word of today, contrary to the seventeenth century ideas of one shop owner, who not only said he would not subscribe to "Our Journal," but in reply to our invitation to send in an occasional shop item said: "Did cha tink I would send in my ideas. Nix—nodding doin'." I keep my trade secrets to mineseelf." Just think of a man harboring that idea these progressive, thriving days. Consider where we would be today if we depended solely upon our ownelves for ideas? What would our craft be? Our tools? Our implements of trade? Co-operate and grow, expand, thrive, prosper. When you come across something new pass it along. A liberal exchange of ideas and a discussion of craft matters is a mutual benefit for you, your brothers and the entire craft.

"What's this mean?" was the query we hurled at Tom Tardy as we found him busily engaged manipulating a whitewash brush over his inside shop wall. "Goin' t' brighten up the shop a bit," replied Tom. "Yer always preachin' about whitewashin' the shop an' I jus' want t' show y' that y' ain't got anything on me." Just then a man came in with a horse to be shod. "Can't get at yer shoein' till this afternoon," yelled Tom, between slaps of his brush and from beneath a shower of white spray. "Want t' finish this up now while I'm at it." But the would-be customer turned around in the doorway and took his animal down the street to Brown's. We asked Tom if he was in business to whitewash or if he was whitewashing for business, but his reply was drowned amid much splashing and slapping, so we left him to his fate.



Our Honor Roll

Extra Special

A New Leader—Mr. Watt Now Second

The Fix-It Shop of Utah now leads Our Honor Roll with a subscription paid up to July, 1935. Mr. G. M. Ferree, proprietor of the Fix-It Shop, when sending in his renewal subscription order, writes:

"Enclosed please find money order for 20 years' subscription to THE AMERICAN BLACKSMITH. I have been taking Our Journal for several years, and would not be without it if it cost \$5.00 a year."

Mr. Ferree's subscription account was already paid up to 1915, but he is so thoroughly pleased with the paper and it is proving so valuable to him that he does not want to run any chance of failure to get it. And then, too, he is thoroughly protected by our refund agreement which insures his subscription at the lowest long-time rate and also protects him should he not be able to receive papers for the full period paid for.

Now—who's next? It's getting more difficult every month to get on the Honor Roll—better pick out a place now. That class of 1924 is still uncrowded—it's easy to get into that. Do it NOW and have your name appear next month.

U. S. and Mexico	Canada	Other Countries
2 yrs. \$1.60 save \$.40.	2.00 save \$.50.	10 sh. save 2 sh.
3 yrs. 2.00 save 1.00.	2.70 save 1.05.	14 sh. save 4 sh.
4 yrs. 2.50 save 1.50.	3.20 save 1.80.	18 sh. save 6 sh.
5 yrs. 3.00 save 2.00.	3.75 save 2.50.	1 sh. save 10 sh.
10 yrs. 5.00 save 5.00.	7.00 save 5.50.	1 sh. save 1 sh.

Send your order and remittance now—today. Don't wait until you forget all about it. You'll never regret it. Our subscription insurance saves you money. The sooner you begin saving the more you save. There is no time better than NOW.

NAME	Subscription Paid to	NAME	Subscription Paid to
THE FIX-IT SHOP, Utah.	July, 1935	W. D. VALENTINE, Iowa.	Aug., 1922
W. C. WATT, Kan.	Dec., 1930	G. HOFFMAN, N. Y.	July, 1922
WADDINGTON FARM, W. Va.	Mar., 1928	J. ERMAN, Ark.	July, 1922
I. J. STITES, N. J.	Jan., 1928	W. K. W. HANSEN, Pa.	June, 1922
J. H. DAVIS, Cal.	Dec., 1924	ROBERT TOCHTER, Cal.	June, 1922
A. BOGGE, N. Y.	Mar., 1924	J. VAN MARTER, N. Y.	June, 1922
F. JACOB, Ohio.	Feb., 1924	E. ANDERS & SON, S. Aus.	May, 1922
E. FOWLER, Pa.	Jan., 1924	LOUISA CARRIAGE WKS., Va.	May, 1922
BRENN & SON, Ireland.	Dec., 1923	S. SMITH, Tex.	Apr., 1922
M. LAMOREAUX, Ohio.	Dec., 1923	J. W. HAAR, La.	Mar., 1922
C. R. DAVIS, N. Y.	Dec., 1923	E. A. DILLON, Nev.	Mar., 1922
F. W. COPELAND, Me.	Dec., 1923	D. W. SMITH, R. I.	Mar., 1922
J. L. TOMLIN, Kans.	Dec., 1923	D. F. KUSTER, Wash.	Mar., 1922
H. A. DAVIS, N. Y.	Dec., 1923	G. F. JOHNSON, Mich.	Feb., 1922
E. H. TROYER, Ill.	Dec., 1923	R. H. KEITH, Iowa.	Jan., 1922
J. BAILEY, Man.	Dec., 1923	O. M. JOHNSON, Minn.	Oct., 1921
F. WATKINS, N. H.	Nov., 1923	H. FELDUS, Neb.	Sept., 1921
J. KOPPIN, Ala.	Nov., 1923	W. K. KLINE, Kan.	May, 1921
W. C. LIENERT, S. Aus.	Oct., 1923	F. NORRIS, Yukon Ty.	Jan., 1921
W. B. ABELL, N. Y.	Oct., 1923	J. L. JESTER, Mo.	Jan., 1921
W. R. TURNER, Man.	Oct., 1923	T. P. CONSDINE, Mass.	Dec., 1920
C. NELSON, Neb.	Sept., 1923	ED. GRIMM, Tex.	Mar., 1920
O. W. TAYLOR, Pa.	Aug., 1923	R. S. CRISLER, Ky.	Jan., 1920
CRAMP BROS., Tas.	Aug., 1923	P. REIF, Ohio.	Dec., 1919
L. C. LARSEN, Iowa.	July, 1923	P. GUDMUNDSON, S. Dakota.	Nov., 1919
S. EFFENHAAR, S. Africa.	July, 1923	R. RAMAGE, N. W. Ter.	Nov., 1919
G. L. DEWITT, Mont.	July, 1923	J. NAIMS, N. Zealand.	Nov., 1919
W. W. GREGG, Tex.	July, 1923	F. UNDERWOOD, S. Africa.	Aug., 1919
O. C. YOUNG, Mich.	June, 1923	F. RASS, Sask.	June, 1919
OTTO SIFFEL, Penn.	June, 1923	THEO. PASCHKE, Neb.	Apr., 1919
A. CHAPMAN, N. Y.	June, 1923	I. M. TOWNSEND, Cal.	Apr., 1919
C. BIRLEY, Md.	June, 1923	G. BISH, Fiji Islands.	Apr., 1919
F. H. SHUPP, Penn.	June, 1923	C. WILLIAMS, W. Aus.	Mar., 1919
J. C. STOVER, Penn.	Apr., 1923	R. TAYLOR, N. Zealand.	Feb., 1919
W. SCHOONOVER, Penn.	Apr., 1923	L. A. TINKING, Kans.	Jan., 1919
J. B. RUNNIE, Iowa.	Mar., 1923	W. S. WAGNER, Tex.	Jan., 1919
LOWRELL BROS., Mo.	Mar., 1923	J. DUBENDORF, Penn.	Dec., 1918
J. CARSWELL, Ark.	Mar., 1923	G. F. LAUGHLIN, Ill.	Dec., 1918
G. E. GLASHER, Ohio.	Mar., 1923	L. M. PIATT, Penn.	Dec., 1918
T. BRADLEY, N. S. Wales.	Mar., 1923	F. BOECKMAN, Ill.	Dec., 1918
G. FATH & CO., S. Africa.	Mar., 1923	W. H. HABERMEL, Iowa.	Dec., 1918
I. T. NENDHAM, Ill.	Feb., 1923	E. T. MARSHALL, Wis.	Dec., 1918
G. C. DRINGER, Miss.	Feb., 1923	F. HOOPFENGARDNER, Md.	Dec., 1918
J. HUGHES, Ohio.	Feb., 1923	HARRIS TECH. INST., N. Y.	Dec., 1918
J. WEBER, Minn.	Jan., 1923	G. E. WINCHESTER, Cal.	Dec., 1918
Z. A. ENOS, Kan.	Jan., 1923	F. T. GRISHAM, Ark.	Dec., 1918
W. G. WISE, Cal.	Jan., 1923	R. E. RUSSELL & SON, Penn.	Nov., 1918
F. S. BISHOP, S. Africa.	Jan., 1923	H. SCHAFER, S. Dakota.	Nov., 1918
S. P. HARNET, Mont.	Dec., 1922	D. MACDONALD, N. S. W.	Nov., 1918
W. BRACKNER, Okla.	Dec., 1922	C. A. RITCHIE, Scot.	Nov., 1918
J. PABIAN, Neb.	Dec., 1922	T. E. SANDERS, Eng.	Nov., 1918
P. FREDERICKSON, Iowa.	Nov., 1922	G. E. HARCADISTE, N. Y.	Nov., 1918
L. O. LEURS, Ill.	Nov., 1922	W. VALLANCE, N. Y.	Nov., 1918
W. LAWSON, N. Z.	Nov., 1922	C. ZIERKE, Iowa.	Nov., 1918
W. H. MILLER, Iowa.	Oct., 1922	CYCLONE GATE & FENCE CO., S. Africa.	Oct., 1918
A. O. MARTIN, Idaho.	Sept., 1922	W. ALSON, Minn.	Oct., 1918
O. A. MORTIMORE, Idaho.	Sept., 1922	H. P. BOWERMAN, N. D.	Oct., 1918
H. J. WYATT, Wash.	Sept., 1922	J. DELANE, Neb.	Oct., 1918
J. N. SKOW, Iowa.	Sept., 1922	P. DEVERNEY, Vict.	Oct., 1918
A. D. STANDFORD, Wash.	Sept., 1922	H. C. HENDERSON, Queens.	Oct., 1918
T. TRICKWIRE, Que.	Sept., 1922	J. ELBY & SONS, S. Aus.	Oct., 1918
A. PFEUTER, Ohio.	Aug., 1922		

NAME	Subscription Paid to	NAME	Subscription Paid to
J. E. MATTHEWS, Eng.	Oct., 1918	J. A. SHEPARD, N. Y.	Nov., 1917
MUNRO & CO., N. Z.	Oct., 1918	McMILLAN, HEAD & CO. S. Africa.	Nov., 1917
D. R. WINTON, N. S. W.	Oct., 1918	C. ANDERSEN, Queens.	Nov., 1917
E. SCHRAPEL, S. Aus.	Oct., 1918	J. KILGOUR, Scotland.	Nov., 1917
J. WILKINSON, Queens.	Sept., 1918	F. R. TOMLINSON, Kan.	Nov., 1917
GRIMLEY, Ltd., N. S. W.	Sept., 1918	KAYE & AINLEY, Eng.	Nov., 1917
C. E. BIRLEY, Md.	Sept., 1918	T. H. ZIEGLER, Wis.	Nov., 1917
J. F. BAGGETT, Queens.	Sept., 1918	SCHOLLER BROS., Ind.	Nov., 1917
J. THORNEYCROFT, N. W. Ter.	Sept., 1918	E. M. WURSTER, Mich.	Nov., 1917
W. A. THUGE, Queens.	Sept., 1918	S. Z. FREY, Ind.	Nov., 1917
A. L. VARRIE, S. Africa.	Sept., 1918	B. A. STEINKE, Ohio.	Nov., 1917
Geo. A. PETTY, Utah.	Sept., 1918	J. N. BATHGATE, N. Dak.	Nov., 1917
G. W. HAZLETT, Pa.	Sept., 1918	W. H. Houghton, Pa.	Nov., 1917
C. WALTER, Ore.	Sept., 1918	G. W. BOOGE, La.	Oct., 1917
T. B. HOLT, Okla.	Sept., 1918	C. R. WALTERS, Ill.	Oct., 1917
ROBERT COOK, Ky.	Sept., 1918	S. SMITH, S. Aus.	Oct., 1917
A. B. WENDLANDT, Wash.	Sept., 1918	W. STEPHEN, Queens.	Oct., 1917
A. J. BROOKMAN & Co., Vic.	Sept., 1918	W. T. CUTKOMP, Iowa.	Oct., 1917
PETER COCKS, W. Aus.	Sept., 1918	Geo. POTSCHEKE, Mo.	Oct., 1917
R. J. TOMPKINS, Texas.	Sept., 1918	J. W. RAPS, N. Y.	Oct., 1917
J. VASCHETTI, Colo.	Aug., 1918	W. C. RONEY, Pa.	Oct., 1917
E. C. PUKTON, So. Aus.	Aug., 1918	J. N. MILES, Ky.	Oct., 1917
V. D. SIBLEY, B. C.	Aug., 1918	C. L. THOMPSON & SON, N. D.	Oct., 1917
L. SMITH, Cal.	Aug., 1918	EMIL PLATH, N. D.	Sept., 1917
W. CHIEB, Queensland.	Aug., 1918	F. STAUB, Ohio.	Sept., 1917
Geo. REID, S. Africa.	Aug., 1918	B. T. LARSON, Minn.	Sept., 1917
H. KELLENBERG, N. J.	Aug., 1918	H. SCHOONOVER, N. Y.	Sept., 1917
W. D. BRADFORD, Cal.	Aug., 1918	PERFECTION SPRING CO., O.	Sept., 1917
A. DISCHER, Aus.	Aug., 1918	W. A. WILSON, N. Z.	Sept., 1917
T. H. GRAHAM, Vict.	July, 1918	R. ROSS, N. S. Wales.	Sept., 1917
GILBERT BROS., S. Aus.	July, 1918	I. E. SPROUD, Me.	Sept., 1917
A. MACKENZIE, W. Aus.	July, 1918	FRED. BLOEM, Tex.	Sept., 1917
Geo. DASH, N. Zealand.	July, 1918	R. E. MATTOX, Va.	Aug., 1917
C. R. OLIVER, S. Africa.	July, 1918	C. T. WOOD, Kans.	Aug., 1917
L. G. REID, S. Africa.	July, 1918	Geo. B. HEATON, N. J.	Aug., 1917
W. M. PURYEAR, Ala.	June, 1918	CLARK & FAUSSET, Queens.	Aug., 1917
THOM & VERSTREE, S. Africa.	June, 1918	C. L. HOCKETT, Cal.	Aug., 1917
L. LACASTE, Que.	June, 1918	H. C. STENZEL, Tex.	Aug., 1917
WRIGHT & SON, Texas.	June, 1918	M. DELJAGER, S. Africa.	Aug., 1917
ALBERT MELLUM, N. D.	June, 1918	F. HOWARD, Kan.	Aug., 1917
J. LINDSAT, S. Africa.	June, 1918	H. FERREL, Ill.	Aug., 1917
J. H. GIBBS, S. Africa.	June, 1918	J. McMEIKEN, N. Z.	Aug., 1917
W. W. BRIDGES, Ark.	June, 1918	F. H. GIERKE, S. Aus.	Aug., 1917
MATTHESON BROS., Iowa.	May, 1918	A. L. PITTINGER, Ill.	Aug., 1917
ED. HOLLAND, Queens.	May, 1918	F. SPINKS, England.	July, 1917
H. L. HASWELL, N. C.	May, 1918	J. P. KELLY, Md.	July, 1917
CHRISTENSEN BROS., Cal.	May, 1918	F. G. STONE, S. Africa.	July, 1917
G. F. BRACKETT, Wash.	Apr., 1918	H. J. DEVONSHIRE, N. Z.	July, 1917
E. KOEPKE, Wis.	Apr., 1918	V. J. HUBBARD, N. Y.	July, 1917
J. H. MARTIN MFG. CO., Ind.	Apr., 1918	J. C. SKINNER, Vict.	July, 1917
H. S. WAYNE, S. Aus.	Apr., 1918	A. FASSENACHT, Tenn.	June, 1917
H. S. YOUNGE, Wash.	Apr., 1918	H. A. CHEEVER, N. H.	June, 1917
W. WELLSAUGEN, N. D.	Apr., 1918	D. SHAFER, N. Y.	June, 1917
W. H. CHIPMAN, Mo.	Apr., 1918	W. R. GELLING, S. Africa.	June, 1917
A. P. STROBEL, N. Y.	Apr., 1918	J. H. BAKERBERG, S. Africa.	June, 1917
E. H. ALBERTY, Pa.	Apr., 1918	A. R. HALLENBECK, N. Y.	June, 1917
J. R. JEFFRIES, Pa.	Apr., 1918	F. C. BOCK, Neb.	June, 1917
R. COLVIN, Ind.	Apr., 1918	W. PRATT, Iowa.	June, 1917
J. LIPPETT, Ill.	Apr., 1918	C. A. STEBBINS, Kan.	May, 1917
OTTO TIEFT, S. Africa.	Apr., 1918	W. S. SULLIVAN, La.	May, 1917
FLA. AG. & MECH. CO.	Mar., 1918	H. SMITH, Queensland.	May, 1917
J. V. FISHER, Ill.	Mar., 1918	P. VANDERBROGHEN, Minn.	May, 1917
H. J. FISHER, Mich.	Mar., 1918	YOST & HALVORSON, Minn.	May, 1917
Geo. SMITH, N. Z.	Mar., 1918	W. MCCOTY, Kan.	May, 1917
AUG. HOLINGAGEL, Ore.	Mar., 1918	A. GUETTLEY, Tex.	May, 1917
A. E. UELING, Wis.	Mar., 1918	C. F. J. LORENZ, N. Y.	May, 1917
J. C. YOUNG, Pa.	Mar., 1918	A. DATWYLER, Ohio.	May, 1917
D. C. HOUCK, Ohio.	Mar., 1918	E. T. HOGMAN, Conn.	Apr., 1917
JOHN EYRE, Neb.	Mar., 1918	O. F. MATSON, Utah.	Apr., 1917
A. E. DELANO, Me.	Feb., 1918	F. PETTIT, Okla.	Apr., 1917
J. S. STAPLES, Ohio.	Feb., 1918	H. G. MARRIOTT, Utah.	Apr., 1917
S. J. BOYD, Idaho.	Feb., 1918	E. THIBAUDAU, Wis.	Apr., 1917
J. MOLITOR, Ill.	Feb., 1918	W. PICKERING, S. Africa.	Apr., 1917
F. P. FELLOWS, N. Y.	Feb., 1918	ED. BURROWS, England.	Apr., 1917
J. W. STEADMAN, Ohio.	Feb., 1918	L. KAUSCH, Wis.	Apr., 1917
J. P. HOLLAFFEL, Penn.	Feb., 1918	J. M. BROWN, Tex.	Apr., 1917
E. N. GATES, Vic.	Feb., 1918	P. PFEIFFER, Ore.	Mar., 1917
RENTON WAGON WKS., Wash.	Feb., 1918	W. WATSON, Vic.	Mar., 1917
WHITING Fdy. Equip. Co., Ill.	Feb., 1918	W. BAGLEY, Mass.	Mar., 1917
J. P. KOENIGS, S. Dak.	Feb., 1918	B. E. CAMPBELL, Mass.	Mar., 1917
RICHARD BRENNER, Tex.	Feb., 1918	P. RUFFER, Ill.	Mar., 1917
W. F. HILL, N. C.	Feb., 1918	G. STANSKE, Wis.	Mar., 1917
O. O. GODERSTAD, Wis.	Feb., 1918	W. H. MILLER, Mo.	Mar., 1917
M. C. BETTIS, Tex.	Jan., 1918	J. C. WOODS, W. Aus.	Mar., 1917
P. SHERRIMAN, Cal.	Jan., 1918	C. BOULTON, N. S. Wales.	Mar., 1917
J. B. BETTEL, Me.	Jan., 1918	C. A. HAWKINS, Ore.	Mar., 1917
W. MISCALE, Queen. Aus.	Jan., 1918	A. L. MONTCOTT, W. Va.	Mar., 1917
S. PORTERANCE, Que.	Jan., 1918	J. PETERSON, Ia.	Mar., 1917
D. C. FOLEY, Cal.	Jan., 1918	J. ANDERSON, Tas.	Mar., 1917
GLEASON BROS., La.	Jan., 1918	A. J. NEILL, Vt.	Mar., 1917
C. E. KRUG, Wis.	Jan., 1918	ED. DETTRICH, Ind.	Mar., 1917
G. E. WOODARD, Kan.	Jan., 1918	LEWIS CHASE, N. Y.	Mar., 1917
P. J. DALLY, W. Aus.	Jan., 1918	E. O. LEE, S. Dak.	Mar., 1917
J. MORROW, Pa.	Jan., 1918	S. STEMPLE, Ohio.	Mar., 1917
G. W. MILLER, Penn.	Dec., 1917	R. S. GUGISBERG, Kan.	Mar., 1917
G. M. SETHMOUR, Ill.	Dec., 1917	J. S. HASKELL, Col.	Mar., 1917
J. TEMPLETON, Scotland.	Dec., 1917	W. L. ROARK, Tex.	Mar., 1917
F. PROCTOR, Tas.	Dec., 1917	A. R. BARLOW, Tex.	Mar., 1917
J. G. JOHNSON, Ill.	Dec., 1917	C. A. WHITACRE, Ohio.	Mar., 1917
F. E. EGGLESE, Ohio.	Dec., 1917	B. P. CARNEY, Ill.	Mar., 1917
C. T. FORREST, Cal.	Dec., 1917	C. STOCK, N. Z.	Mar., 1917
THEO. BUSH, N. Y.	Dec., 1917	T. J. DORSET, Conn.	Feb., 1917
J. T. ELLIOTT, Ill.	Dec., 1917	F. MARSE, Mich.	Feb., 1917
J. VOELPEL, Ill.	Dec., 1917	J. H. WHITE, N. H.	Feb., 1917
W. J. MAIN, Cal.	Dec., 1917	McGOWAN BROS., N. Y.	Feb., 1917
J. G. LAUER & SONS, Mo.	Dec., 1917	J. W. HAUGHT, Ill.	Feb., 1917
MESS BROS., Victoria.	Dec., 1917	IRVING BROS., N. Y.	Feb., 1917
E. BLOOMER, Aus.	Dec., 1917	W. H. SCHENE, Neb.	Feb., 1917
H. P. ADAMSON, N. Zealand.	Dec., 1917	A. J. H. WEGENER, S. Africa.	Feb., 1917
C. E. RHYME, N. Y.	Dec., 1917	H. SCHNETTE, Ill.	Feb., 1917
J. H. ROBERTS, Mich.	Nov., 1917	E. DOUGHERMAN, Ohio.	Feb., 1917
G. E. BARTLETT, Wash.	Nov., 1917	CHAS. F. GIESSE, N. Mex.	Feb., 1917
F. FROELICH, Tex.	Nov., 1917	M. E. GOLLE, Pa.	Feb., 1917
		J. POTTHOFF, Neb.	Feb., 1917



Your Trade Paper and You

Elbert Hubbard

The only excuse for the existence of a trade paper is its ability to be of service to the subscriber in his business. No matter how strong a man is, he needs help. Alone, a man is only a leaf in the storm.

Success in business depends on knowing what other people in the same line of business are doing. We have to know everything that is a success in our particular line of business. Your trade paper is a sort of central station where ten thousand wires meet. The editor of a trade paper has to be a deal more accurate than the editor of a regular newspaper.

The news that your trade paper supplies must be authentic.

The sensational, the emotional, and all accounts of suicides, seductions, assassinations, conflagrations and embezzlements, are safely omitted from the columns of your trade paper.

These things do not make the world go 'round. What we often call news in the newspapers is bad news.

The editor of your trade paper picks up every successful venture along his own particular line of business and gives it out to his subscribers.

Your trade paper means uplift, courage, inspiration, good-will.

It adds to the well-being of the subscriber, gives him a new point of view, prevents nostalgia, makes for fellowship, and gives a man a feeling

that he is no mere interloper between earth and sky, an alien in a foreign country.

Your trade paper makes the subscriber feel at home.

It puts him in touch with the best that is being said and done in his particular line of business.

Your business is the most important thing to you in the world. It not only supplies you a living, but it keeps you out of mischief. Your business is the thing that keeps you busy, that gets you up in the morning, sends you to the shop, fills your working hours and your day-dreams, and night-dreams as well.

How any man can hope to do business successfully without the assistance of a trade paper I do not know.

The trade paper is the one thing that binds you to your fellows who are working along similar lines.

Your trade paper is a school, an inspiration. The business of your trade paper is not only to give important happenings, but it is to cement human hearts.

We are strong only as we stand together; we are weak as we are alone. And let any man once feel that he is alone, soon his reason reels and his mind totters.

No trade paper could exist very long, except it merits the confidence of its subscribers. The relationship between editor and subscriber is essentially that of mutuality, reciprocity, and co-operation.

Practically, the editor of your trade paper is in partnership with you—he has to know your business that he may intelligently write about it.

He must have the interest of your business absolutely at heart.

Every possible betterment he must suggest and explain.

If there are broken bridges and a bad line of mud and sand ahead, it is his business to give due warning.

He advises, suggests, admonishes, warns, and thus does he strengthen, assist and help in the onward and upward march.

Business today is a struggle for existence. You can't hope to succeed unless you are right in line with the best that the world is doing and thinking.

Any man who says, "This is good enough, let 'er go, who cares," is putting the skids under his prospects.

Your trade paper is pumping power

into the business of every subscriber—into your business.

And I think a little expressed gratitude on the part of the subscriber towards the editor of your trade paper is not out of order.

If you find a good thing in your trade paper, just write to the old man and tell him so.

When your trade paper comes, open it before you do any other publication; it is more vital to you; it means more.

Take the wrapper off at once and read it from cover to cover, advertisements and all, for in the advertisements of trade papers you will also find a deal of concentrated wisdom.

The whole business is built up on brotherhood, and when you write the editor of your trade paper just remember this: that the man who reads your letter has your interests at heart, and he is going to protect you and benefit you in every way possible; otherwise, he could not possibly exist at all.

Not only do I advise a man to read his trade paper, but I suggest that he pay for it enthusiastically and promptly. The very fact that one has thus paid his subscription will help him to appreciate the publication.

So all you subscribers just cultivate a little of that beautiful thing called gratitude, and while gratitude may be a lively sense of satisfaction on account of favors about to be received, yet the genuine article is a sense of gratitude for favors already rendered.

Out of every issue of your trade paper you should get at least one big idea. And this you should make a note of. Write it out briefly and put it where you can lay your hands on it. The very act of writing it will help fix it in your memory.

Co-operation is the keynote of success, and when you read and absorb your trade paper you co-operate with the ideas which help your business.

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A Small Collection of Trotting and Pacing Shoes

DR. JACK SEITER

The accompanying engravings show thirteen different types of trotting and pacing shoes. I will try to explain the construction of each and tell



something about its use. Ofttimes we read about a shoe or a certain type of shoe and unless we know just exactly what the author is writing about we may be in some doubt regarding the construction of the same.

In the engraving, Number One is known as the Memphis Nub Shoe: This is a modified form of the Memphis Bar Shoe (see Style No. 9), and has practically replaced it as a shoe to gait trotting colts with. It is used where a rolling motion is needed. An eight-ounce shoe of this type gives practically the same amount of rolling motion that formerly required a shoe of twice the weight.

Number Two—Rim Steel Shoe: This is an ideal pacing-horse shoe, especially where the animal requires a good foot-hold. Unlike the calked shoe it requires no effort on the animal's part to break over the toe easily. The material can be bought in all sizes; consequently it is a simple matter to make shoes of any desired weight. It also makes a good form of hind shoe.

Number Three is a Swedged Shoe: This is an ideal type of shoe for use on trotters, as it is easily fitted and furnishes a good flat bearing surface together with a firm foot-hold on either a hard or soft track. It does away with the toe grab, and because of its difficult breakover it is generally fitted with a pair of heel or jar-calks to break the concussion on a hard track. It also makes a good foundation for a bar shoe. The swedged shoe is also largely used on the hind feet, as it gives a perfect toe-hold, without any extra elevation of the toe and with no danger of a badly cut quarter, as is often the case when the toe-grab is used. A swedged shoe is considerably lighter in weight than a shoe armed with grabs and at the same time furnishes a better surface for the foot to rest upon. The opponents of the swedged shoe claim that the groove or crease fills up with dirt; but what gives a better foot-hold than dirt upon dirt?

Number Four is a Scoop and Rolled Toe Combination: This is an excellent type of shoe for trotters, as it allows for a free breakover, and the ridge which separates the roll from the scooped portion furnishes an excellent grab. When properly made, this shoe will give the rolling motion and still prevent the slipping back of the foot.

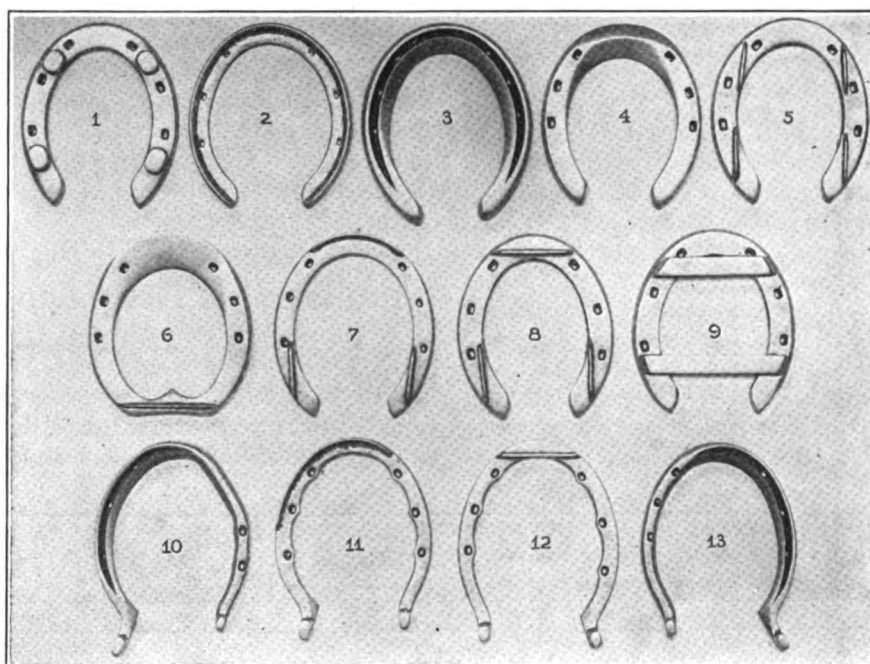
At Number Five is shown a Four Calk Shoe: This form of shoe has not been in great demand recently, but at one time was widely used as an anti-knee-knocking shoe. The four sharp calks are supposed to prevent the foot from turning or twisting as it is about to leave the ground.

Number Six is a Scoop Toed Bar Shoe: This is an anti-elbow-hitting shoe and has been used with great success on several well known trotters. Its general use is not advised, as the sharp calk that runs across the bar has a tendency to check the foot up too suddenly as it strikes the ground, and in this manner it has caused considerable lameness.

Number Seven shows a Three Calked Pacing Shoe: This is a good type of shoe for a bold, free-going pacer, the calks minimize the danger of concussion and the toe-grab fur-

too far ahead from the point of the heels and let them drop down too low, thereby straining the tendons and ligaments. The forward bar supplied what little virtue the shoe possessed, as it furnished a good rolling breakover. See notation on Memphis Nub Shoe, Style No. 1.

Number Ten shows a Half-Swedged Oblique Toe Shoe: This shoe is used on pacers. The swedged outside furnishes a good foot-hold and prevents the foot from being carried in too far, the hoof projecting out over the oblique portion, the sharp edge being slightly rounded off to prevent injury to the quarter in case it should be hit. This shoe may be used with or without heel-calks. If the inside of the hoof cannot be dressed low enough, as it should be in all cases where there is danger of the animal cross-firing, it is advisable to simply



A COLLECTION OF TROTTING AND PACING SHOES OF DIFFERENT TYPES

nishes a good foot-hold. This style of shoe was worn by Dan Patch (1.55 $\frac{1}{4}$) in all of his fast miles.

Number Eight is a Three Calked Trotting Shoe: This is a type of shoe widely used; the calks break the concussion of hard tracks and the grab gives a good foot-hold. The grab is set back from the toe to allow for a free and easy breakover.

The Memphis Bar Shoe is Number Nine: This shoe was very popular several years ago, but was the direct cause of many bad tendons, owing to the fact that the hind bar was set

turn up a heel-calk on the outer branch of the shoe and leave the inside heel plain.

Number Eleven is a Hind Pacing Shoe: This shoe (like Style No. 7) is for the use of a strong-going pacer. The grab around the toe should run well around to the outside quarter, and if the foot is properly dressed this grab will prevent the foot from being carried too far in and thus prevent cross-firing. This style of shoe was worn by the pacing king, Dan Patch (1.55 $\frac{1}{4}$) in all of his trials against time. In case a horse has



long sloping pasterns, and the low heels that generally go with them, it is advisable to use a long, high side-calk on the outside heel. In other cases it is well to let the grab run around the entire outside to the point of the heel.

Number Twelve shows a Hind Trotting Shoe: This pattern of shoe is used more than any other for trotters, generally without the toe-calk; it may also be used with a square toe. When a grab is needed, set it well back from the point of the toe.

Number Thirteen is a Half-Swedged Cross-Firing Shoe: This shoe is the same as Style No. 10, excepting that the toe is not oblique. This is the standard pacing-horse type of shoe and is universally used all over the country where pacers are raced. The inner branch of the shoe is swedged half round.

The Oklahoma Convention

The Fifth Annual Convention of the Blacksmiths, Horseshoers and Wagonmakers of Oklahoma took place at Tulsa on January 19th and 20th. The meeting was one of the most successful ones in the history of the organization. The officers elected for the coming year are: C. W. Rathbun, re-elected as president; R. E. Wise, vice-president; and J. P. Nicholson, re-elected as secretary. The board of directors consists

establish a price list, and every blacksmith, horseshoer and wagonmaker in Oklahoma who is a member of the State Organization is to have a printed copy of the rate agreements posted in his shop, and any variation from the set if reported to the president of the organization will be immediately investigated and, if the violation was committed with the intention of "price-cutting" a competitor out of business, the guilty party will be ousted from the organization.

Although there are nearly 500 members in the State Association at the present time, a campaign movement for new members was launched. This the officers say will result in doubling the membership within the next year.

Secretary Nicholson was instructed to communicate with every man of the craft in the State who is not a member and urge him to affiliate with the organization.

If you are located in Oklahoma State, communicate with Mr. Nicholson at Kingfisher, and join this growing organization. You'll get more out of it than you ever put in. Ask Nicholson.

The Business from a Practical Smith's Viewpoint

H. M. TOTMAN
Bookkeeping—5

The writer makes no pretense of being an expert accountant, and this article is written for the benefit of

will show a man, in the simplest way, his cost (net and gross) and his debit and credit accounts with his customers is sufficient for the average custom shop. So we will confine ourselves to the ordinary single-entry day book, ledger and cash book.

The net cost, it may be well to explain, is the initial or material cost, that is, the cost of an article just as it comes in the shop. The gross cost is the net or initial cost plus the overhead expense, such as light, heat, fuel, rent, salaries, time, etc.

We believe it wise to keep a dollar bank account and pay all bills of one dollar or more by numbered checks. And where located in a banking town I would pay the employees in the same way, because it often avoids disputes. However, the one objection to this is that some of the men will have their checks cashed in saloons, but, of course, drinking men will spend their cash in these places just the same if they so desire.

It sometimes happens that a receipt will become lost and a claim be presented the second time for payment, whereas, if it had been paid by check, the voucher can be quickly located and all disputes settled. We find it a good plan to get check blanks in book form of 300 or more (which the general run of banks furnish free to their depositors). Then when your bank book is balanced, which should be done every 60 days, attach the voucher to its stub with mucilage

OWNERS		RECEIPT.		DELIVERY	
No. 10.	NAME.	DATE.	KIND.	DATE.	PRICE.
	John Smith	11/1/13	Auto.	2/1/13.	\$65.00
WOOD DEPT.	Repair				
SMITH DEPT.	Straighten front axle.				
TRIM DEPT.	Recover top. (Pantasote.) repair cushions, new carpet.				
PAINT DEPT.	Touch up as needed.				
OFFICE.	new tail lamp.				
REMARKS:	Put in first-class order.				

FIG. 1—ORDER SLIP SHOWING WORK TO BE DONE IN EACH DEPARTMENT ON A GIVEN JOB

of W. R. Lautz, M. Parks and J. J. H. Reedy.

To establish uniform prices among the craft in Oklahoma was one of the principal topics discussed in their closing session. It was decided to

those whose business does not justify the employment of a high-salaried bookkeeper. Single and double entry systems have their advocates with good arguments on both sides, but it seems to me that a system that

and it is always easily found. Carry your balance forward on each stub so as to guard against any overdrafts. This will show at a glance the amount of cash business you have done. The most difficult book to keep balanced



is the cash book, because one is so apt to forget about money paid out or received in small sums. Therefore it is a good plan to balance this book every night.

The charge and credit accounts of customers is very simple so far as the day book and ledger is concerned; but not so with the department charges. We supply every man with a pencil pad, and require him to mark down the stock used and labor done on each job, and the total time so charged must equal the time of the day's labor as paid for by the proprietor.

As stated in a previous article, without some sort of checking system, small jobs are often done for which no charge is ever made, resulting of course in a considerable loss in the aggregate. To prevent this, have some entry books printed, as shown in Fig. 1. These slips can be made up with three or four on a page, with

CASH.					
No.	1	Let 4 Tires	15	d	2 50
		Iron work on pole and bolts	5	d	75
		New heavy pole	76	W	3 50
		New carpet in Plaster	100	T	2 50
		10 yds 30 rubber @ 100	2.00	O	10 00
		Monogram on Auto.	P	4	00
					23.25

FIG. 3—HOW ENTRIES ARE MADE IN THE CASH BOOK

the entry book to make certain of accuracy. The writer has found that it saves labor and time to place a pencil and book in each department and to take the order slips from these books. The gain is in the readiness with which one can see at a glance

the exact cost of painting work, as the paint shop is usually a losing proposition, due largely to ignorance of real cost.

Now, how are we to ascertain approximately from week to week both the net and gross cost and the comparison with similar periods in other years? I do not suggest an auditing plan, but one that gives safe, comparative knowledge from week to week. In many cases a shop is steadily losing money in one or more departments while others are quite profitable. At the end of a year an inventory is taken, the books balanced, but no profits are shown. We submit this proposition: A shop has had plenty of work, has had no misfortune or loss and, of course, a profit should be found. If it does not show up, there is something wrong; the question is how to find the error. A ledger account in each department would show this at the end of the year, but we want a quicker way that is approximately correct. With this end in view the following method has been worked out and proven satisfactory: Get a journal ruling and use it for a day book. In making the charges, keep the different department charges separate—do not make one charge for smithwork and woodwork together. Then, in one column, place opposite each charge the net cost of stock used. On Saturday night foot up the total charges for the week for each department, add the labor cost as shown by the pay-roll and deduct the stock and labor charges from the total amount of work done, and you have the gross profit for the week. Then deduct the overhead expense, which we average for the year, and you have the net profit for the week.

JAN. 3006					
No.	Tom Jones	STOCK COST.	DEPT.		
1	To 6 spokes #125 2 fullirins #302	85	W.	4	25
	Full set 1" Steel Tire.	115	O.	7	50
	Painting reins - 3 coats.	10	P.		75
	New J.B. rubber curtains (2)	169	T.	3	50
	2 Carriage Campers.	599	O.	7	50
					23.50

FIG. 2—A SPECIMEN ENTRY IN THE DAY BOOK

about 400 pages bound in cardboard. I usually order six books and have the shop name printed on them.

Have it distinctly understood that no work is to be done except on office orders. Make out a slip for each department every morning, showing the work that is to be done that day, giving the number (not the owner's name), and have the workmen make their entries and charges by numbers. (It is sometimes better that the men don't know for whom the work is being done.) Small jobs may come in during the day for immediate attention, but the person in charge can easily regulate that part. Just before quitting time at night, collect the charge slips and check off with

the work that is to be done in any department and just when delivered. When the final charge is made on any job, cross it off the order book. If you will try this method for three months I am sure you will keep it permanently.

For jobs that require painting it is well to get the repair order books with cards sold by Ware Bros., of Philadelphia, Pa. The writer has used these cards for over twenty years and finds them very valuable and cheap. The painter marks down the details of each job of painting, such as the grades of varnish and paint, the number of coats, the time spent, etc., on these cards. In this way one can determine the best stock as well as



Cash items (work paid for when finished) are entered in the same way in the cash book and included in the sum total at the end of the week. The "office" is designated when a sale is made of material to which there is no labor attached by any of the shops.

It will be noticed in Fig. 4 that the office ran behind. This is often true if few or no sales have been made and the office is charged with part of the salary for management or book-keeping. The overhead expense is obtained by taking all the expenses of the year (outside of stock and labor as per pay-roll) and dividing by 52; this will give the weekly average, which is divided among the departments proportionately to their relative importance.

During the dull months the report as a whole will sometimes show a loss, but this is due to the small amount of work done. If a gross profit is shown at such times it is evident that all is O. K., but if there is a loss in gross

each department for the year. After a number of years it is interesting to compare and know if business has been increasing. The only uncertain factor is the stock charge; be sure to put it high enough, so that if there is a discrepancy it will be in your favor. The writer with a repair trade of from \$400 to \$600 a week can make this weekly report within one hour. Is it not worth while to KNOW?

The paint department is kept entirely separate, for the reason that it is usually not a profitable paying branch and all the others are.

At the close of the year one has to take from the net profit all poor debts or allowances and deductions for the year; the remainder is the amount of net profit shown by each department. It will be slightly in excess of the figures if care has been taken to allow a liberal amount for stock at each charge.

From the data given it is an easy matter to figure the percentages of business done, of stock and labor and

made clear I will gladly attempt to make myself understood.

(To be concluded)

Smithing Coal and the Forge Fire

JAMES CRAN

Amongst the materials used by blacksmiths, coal may be said to be one of the most important. Without smithing coal of good quality, iron and steel may be rendered practically useless, hours of hard work go for nothing and the blacksmith's reputation as a workman may be impaired.

This does not mean that all poor blacksmithing can be laid to coal, as there are far too many calling themselves blacksmiths who could not do a really fair job at the forge no matter what quality of coal they used; and this class generally find excuse for their poor work other than their own inability.

The fact remains, however, that coal of good quality for blacksmithing is essential to good work, particularly when we come to think how much depends upon it. A piece of valuable machinery may be ruined through a poor weld in a chain used to lift it; a railroad accident may result through a similar cause; a steamship is not immune from mishap, should some vital part give way through poor smithwork. Therefore, in the interests of the public, of property, of life and limb and of his own reputation as a workman, the blacksmith cannot be too particular in insisting upon the coal he uses being of the best possible grade for the purpose for which it is intended, even should its cost be double that for which he can buy a poorer grade.

The time was when much less was heard of poor coal than at present, and the writer is of the opinion that from fifteen to twenty years ago coal sold for smithing purposes was much better on an average than it is today. One brand in particular, namely George's Creek, was sworn by, by most blacksmiths—now it is often sworn at. Some claim that the large veins of good smithing coal in the Cumberland Mountains of West Virginia, where the George's Creek brand comes from, are played out; this may or may not be the case, but the fact remains that smithing coal of excellent quality still comes from the Cumberland district.

SHOP REPORT WEEK ENDING - Nov. 8 th 1913.													
	WOOD.		SMITH.		TRIM.		OFFICE.		TOTAL.		PAINT.		TOTAL
WORK.	35	00	110	00	41	00	17	50	168	50	80	00	248 50
STOCK.	5	00	12	75	14	00	10	25	41	00	17	50	58 50
LABOR.	18	00	42	00	16	00	10	00	86	00	41	00	127 00
BOTH.	23	00	54	75	30	00	20	25	127	00	58	50	185 50
GROSS PROFIT.	12	00	55	25	11	00	-2	75	75	50	21	50	97 00
OVER HEAD.	10	00	12	00	9	00	12	00	43	00	17	00	60 00
NET PROFIT.	2	00			2	00	-14	75	32	50	4	50	37 00
REMARKS.	Book accounts increased \$61.50 Cash Rec'd.												
	<u>Weather fine</u> \$187 00												

FIG. 4—WEEKLY SHOP REPORT GIVES REAL BUSINESS INFORMATION

account it shows that prices are too low.

At the end of the quarter (13 weeks), summarize the weekly report and enter in a long book. At the close of the year, summarize the quarters and you have a complete report for

of profits. Also knowing the investment of capital in each department one can easily figure the percentages of profit on investment and know absolutely which are profitable.

These articles are written by a busy man. If any point has not been



The Coal Dealer

One reason for some of the most popular brands of smithing coal falling into disfavor is because of unscrupulous coal dealers who for the sake of larger profits substituted coal of inferior quality, with the result that blacksmiths have become discouraged and tried other brands, with

coal, when a lump has been freshly broken, ought to show a bright, clear black, break easily into cube-shaped pieces, be free from dull, dirty, as well as bright yellow and blue streaks, and should also contain the smallest possible percentage of sulphur, slate, stone or other impurities which combine under heat and form clinker.

as the center if allowed to burn out too much allows the cold air from the blast to come into contact with the metal being heated and causes it to oxidize or scale. This is one of the greatest drawbacks to welding or even to clean forging from the solid.

Some blacksmiths have a practice of soaking their coal with water

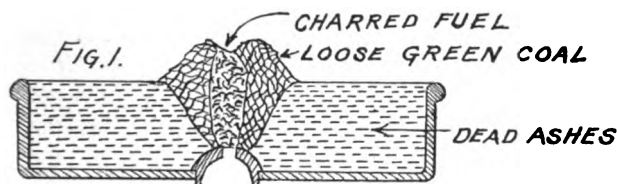


FIG. 1—A LOOSE FIRE FOR LIGHT BLACKSMITH WORK

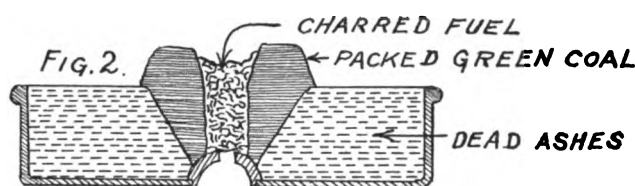


FIG. 2—FOR HEAVY WORK THE WELL-PACKED FIRE IS USED

anything as a rule except gratifying results. Sometimes a supply of really first rate coal for blacksmithing could be had, and the blacksmith thinking the coal problem had been solved would when again in need of a supply, order the same brand from the same dealer. But when it came to hand it would often be found to be much inferior to the lot that preceded it. Still the dealer would maintain that the coal was the same, that he had bought it from the same company as the last and that they only mined one kind of coal. That and a lot more hot air which usually did more to warm things up than a good big fire of the coal in question. The blacksmith, however, is generally the fellow who gets stung, as he has the coal and the dealer has the cash.

It is no exaggeration to say that at least ten times the amount of coal of popular brands has been sold to blacksmiths than was ever mined.

When blacksmiths experience difficulty in getting coal of uniform quality from their local dealers it would be to their advantage for several of them to club together and order a carload direct from the mines. This plan, although it may not appeal very strongly to some blacksmiths, is a step in the right direction, as co-operation in buying is just as essential to the common weal of blacksmithing as it is in price-setting and catering to the needs of customers. Another thing to be considered is the fact that in buying coal direct from the mines, the blacksmith saves the profit that would otherwise go to the dealer.

How To Tell Good Coal

It is sometimes rather difficult to determine the quality of coal by looking at it, but good blacksmithing

It is next to impossible to get coal absolutely free from sulphur, but if it does not exceed 1% its presence is not objectionable. That amount will have no perceptible bad effect upon the work, but should its presence much exceed 1%, difficulty will be experienced in welding.

The writer has found that a good way to try out coal is to build a fair-sized loose fire, turn on a light blast for from one half to three quarters of an hour and then shut off the blast and allow the fire to die out gradually. By doing this, whatever impurities it may contain will solidify in the shape of clinker at the bottom of the fire. Then when the blast is shut off, whatever ash forms will settle and can be examined. Any slaty or stony matter can be detected and a good idea of the coal's coking qualities can be had.

Building a Fire

The type of fire generally used by horseshoers, wagon and carriage-ironers and others doing the lighter kinds of blacksmithing, is known as a loose fire. To build it, the hearth or firepan is cleaned out, down to the opening of the tuyere. Over the tuyere opening the new fire is started with the coke that has been left over from the previous fire. Fresh or green coal is then placed around it in such manner that the charred fuel is all in the center, as shown in Fig. 1. As the center of this fire burns, the charred sides are forced inwards and more green coal is placed around the outside. Thus the center is kept well supplied not only with well-charred coke but at a heat almost equal to the hottest part of the fire. This type of fire needs almost constant attention to keep it in proper condition,

before using it. Whether they do this because it has become a custom or because they have some special reason for it the writer has never been able to find out. At any rate some very lame excuses are advanced in favor of the practice. Were it possible to burn water on the forge fire or even coal that has been soaked in it there would seem to be some object in wetting it, but so far the writer is from Missouri. Water, however, should be convenient to the forge, particularly when using a loose fire with a covered top, so that it can be sprinkled from time to time to keep the flame from breaking through. But apart from that it is useless. Coal fit for blacksmithing will coke perfectly without water, and the greater part of the heat generated goes to heating the material being worked instead of drying out the coal.

Packed fires, generally used for heavier forging such as railroad and machine blacksmithing, are built differently. The hearth or firepan is cleaned out similar to cleaning out for a loose fire, only more of the dead ashes are removed around the tuyere. A rectangular block of wood from 3 to 6 inches on the sides and from 15 to 18 inches in length, according to the size of the fire being built, is placed on end over the opening of the tuyere. The coal, which ought to be broken up fine and moistened with water just enough to make it stick together, is then packed firmly around the block up to the level of the forge top. Above the level of the forge top a bank from 4 to 7 inches high is built on either side, as shown in Fig. 2. The block of wood is then withdrawn and the fire started in the hole. Fires of this kind when



once started are kept going with the well charred coke left over from previous fires. When a hollow fire of this type is wanted, a large firebrick may be placed over the side banks or a piece of board may be used. When a board is used it is covered over with fine moistened coal until the outside resembles an old fashioned bee hive with an opening in the front. Once the fire is lighted the board soon burns out, leaving a well charred cavity. This the writer thinks is the best type of fire for welding anything two square inches or over in section. Should it be necessary to close up the front of a fire of this kind a few large pieces of coke may be used, as they can easily be removed when placing or withdrawing work.

It is of the utmost importance, whatever type of fire is used or whatever class of blacksmithing is being done, to have sufficient depth of fuel between the work being heated

varying degrees of success, but for some time has used nothing but the brand known as Webster Smithing Coal. It has given equal satisfaction when used for the heaviest forging and welding as it has when used for the lightest and most delicate kinds of fancy forging, as the accompanying engravings show. The pieces here shown speak for themselves, and any blacksmith knows that work of this kind can only be forged in separate pieces and welded together by using coal of the very best grade.

While all blacksmiths are familiar with coal as it is delivered ready for use, still there are a great many who know comparatively little about mining, which in itself is a very interesting subject. A great deal of the best smithing coal underlies other coal workings and has often to be raised 500 feet or more to the surface. Smithing coal is always in strata or layers of varying thickness, between

cause there are fundamental elements that must be known and upon which depend the merits of the results produced.

This truth applies to wheels. There are certain fundamental elements in the manufacture of wheels and in the selection of the material for them of which the wheelmaker must have a practical knowledge, that the goods may be made right. The purchaser of wheels should satisfy himself that his source of supply has this knowledge of wheelmaking and the ability to properly execute it.

First, and most important, is to select the right kind and quality of material. For light wheels, hickory is the only material that has been discovered up to the present time which is satisfactory. But even in hickory, all material is not satisfactory for good work.

In the Hickory Family there are old and infirm trees that have reached a period where they have commenced to decline—the wood of which is good only for firewood. Then there are middle aged and young trees, the wood of which is capable of standing almost any reasonable service that may be required, provided that it is prepared and protected as it should be. It is from this class of material, found in these middle aged and young trees, that good wheels are made. Even in these two classes of trees, material is found which differs widely in strength and toughness—the two principal factors which determine the quality of stock. This fact makes it necessary to find the proper basis for correctly judging stock.

Formerly, stock selection was based largely upon color—it being believed that white stock was better than the red. This tradition was found to be false, and was thoroughly exploded by the results of mechanical tests, initiated by the Muncie Wheel Company, who furnished spoke material for the tests, and carried out in co-operation with the United States Forest Service, at their testing plant at Purdue University, Lafayette, Ind.

The results of these tests were published by the Forest Service in illustrated Circular No. 142, and proved conclusively that red hickory of *equal dry weight* is just as good as the white, or in other words, that color is no basis for grading, *but that*

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FIG. 3—SOME OF MR. CRAN'S DELICATE WORK WITH THE HAMMER

and the blast to consume the oxygen in the air. Otherwise the blast will oxidize or scale the metal, making good welding and clean forging impossible. There is no definite rule to go by for the depth of fuel between the metal and the blast, as the size of the work, the size of the fire, the blast pressure and the amount of clinker that has formed over the tuyere have all to be reckoned with. It is always preferable to keep the fire as free from clinker as possible, but there are times when taking a second or perhaps a third heat upon a piece of work when it does not pay to disturb the fire any more than necessary until the work is completed.

Good Coal

Returning to the question of coal, the writer has tried many kinds with

which there are layers of poorer grades of coal, slate and stone. Often several of these layers have to be mined at the same time, and the quality of the coal when it is delivered often depends to a great extent upon the care that has been taken in separating it after it is mined.

The accompanying illustration, on page 154, shows the power house, pumping equipment, water tanks and hoisting machinery of a bituminous or soft coal mine.

The Manufacture, Care and Use of Wheels*

Construction of Wheels—The Quality and Selection of Material

O. B. BANNISTER

If you build a bridge, you employ a competent engineer. Why? Be-



weight alone, defects being considered out, *is the true basis*.

For example: The spokes which were furnished by the Muncie Wheel Company to the Government, being graded upon the *color basis*, were found to be as much as fifty per cent in error when the weight basis was taken, and the weight basis was found to govern the strength and resilience factor.

To illustrate: Some spokes which had been classed as "D," or fourth grade, on account of their red color, were fifty per cent greater in strength than some spokes which were of a lighter weight, but which had been classed as "C" or, third grade, on account of their white color.

Generally speaking, heart wood in most all species is considered to be more durable than sap wood, and it is argued by some that red hickory is more durable than white. All red hickory was at one time, during the growth of the tree, white. Its change in color is due to the infiltration of lignin (Nature's process of changing a "Boy Tree" to a "Man Tree") in the cells and cell walls, and this action gives to a certain extent a great density per cubic unit of wood; thus reducing the water-holding capacity and retarding the permeability with respect to absorbing moisture.

The mechanical tests referred to show the fallacy of prejudices that exist in the trade and help to eliminate them, but most important of all, the tests give the manufacturer of wheels the necessary knowledge which enables him to serve the buggy manufacturer to the best advantage, in that the wheel manufacturer is enabled to give the buggy man the proper quality of stock and have it properly graded, and thus he has the fundamental elements upon which to build in each of the mechanical steps which follow in making the finished wheels.

It can, therefore, be seen that the true basis of grading for service is the basis of weight, and that the manufacturer who grades his stock upon this base serves his trade to the best advantage in selection of stock, and uses material in spokes and rims, which is of the uniform quality and the best value for the money.

After the material for wheels is carefully selected as to quality and size, then it is thoroughly seasoned and prepared in the most modern

and scientific way, so that when it is ready for the wheel, it is matched as to quality and strength, ready to do the service required of it, whether it be driving or hauling.

We have thirty separate dry kilns of the most modern type, each kiln capable of holding two carloads of material, giving us probably the largest drying capacity in the United States, and at all times insuring our customers of the proper kind of curing of stock. No wheels leave this factory except they are bone dry.

Good material carefully matched and selected alone does not make a good wheel; it must be mechanically put together. A carpenter may be able to build a fine house, but it requires the best of machinery and technically skilled mechanics who are trained in their work to produce a good wheel.

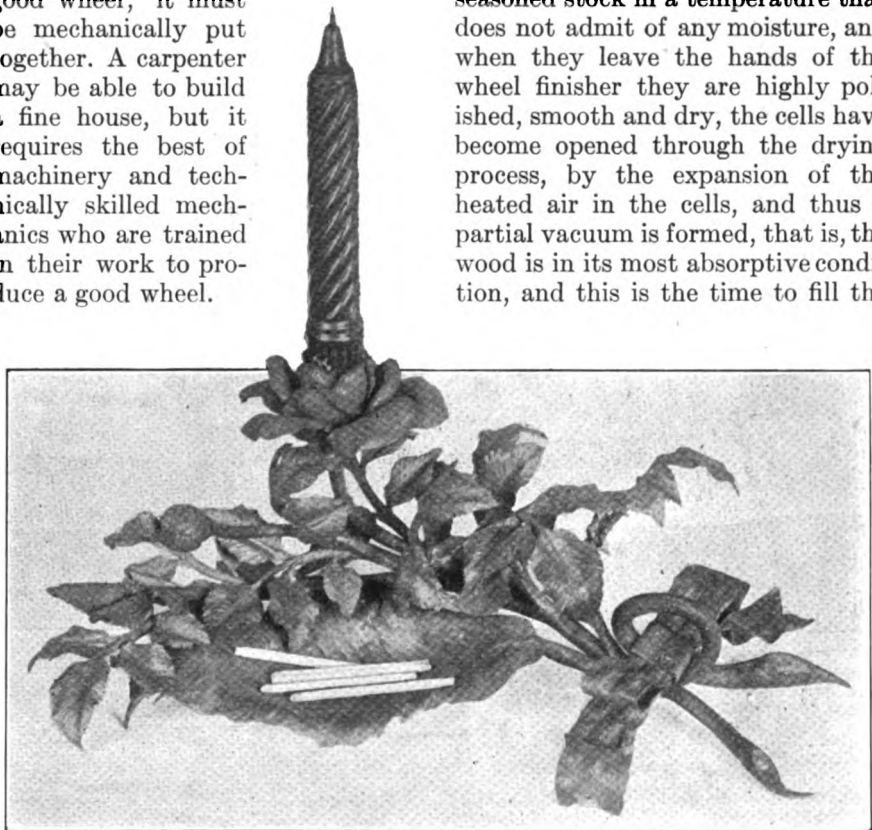


FIG. 4—THE SIZE OF THIS PIECE MAY BE JUDGED BY THE MATCHES IN THE TRAY

All of these features are employed by the wheel manufacturer today, and when he delivers his wheels to the carriage manufacturer they are as near perfect as they can be made.

All of this care upon the part of the wheel manufacturer will count for little if the carriage manufacturer and the user of the vehicle fail to do their duty in taking proper care of the wheel.

Priming Wheels

The priming of wheels involves the physical principles employed in the open tank method of treating

timber with creosote. In this work the timber is first thoroughly dried and then boiled in the treating mixture until it is heated through, which causes a partial vacuum in the cells. It is then immersed in a cold bath of the mixture which causes a contraction of the air in the cells and a consequent "sucking in" of the mixture. By this method a penetration of one half to two inches, as desired, is secured.

All wheels when finished should be given a coat of oil and lead primer at the wheel factory before shipping, as wheels are made from thoroughly seasoned stock in a temperature that does not admit of any moisture, and when they leave the hands of the wheel finisher they are highly polished, smooth and dry, the cells have become opened through the drying process, by the expansion of the heated air in the cells, and thus a partial vacuum is formed, that is, the wood is in its most absorptive condition, and this is the time to fill the

pores with primer. If it is neglected, and they are shipped without priming, the effect of a change to a cold, damp atmosphere, such as they are subject to in the ordinary freight car, is to rapidly fill the pores of the wood with moisture, causing the wood to swell and the grain to rise.

If wheels reach the carriage manufacturer in this condition, and are primed as soon as received, the moisture is sealed into the pores of the wood, and if tire is put on them before this moisture is taken out, the result is loose tire, rough wheels,



dissatisfaction, complaints, and claims that the wheels have been made from green material. It is not green timber, but a neglect of a very plain duty, which was to prime the wheels when they were READY for priming.

Arrival at the Carriage Factory

When wheels are received at the carriage factory in damp, cold weather, either with or without priming, the first care should be to properly dry out the moisture they have gathered. This should be done gradually.

Preparation for Tiring

We always leave the rims a little long, enabling the carriagesmith to give the wheel any dish desired. Before tiring, the rim joints must be tight and the rims close to the shoulder of the spoke. If they are not, drive them home, and if the tenons are loose, wedge them down to the shoulder. This is objected to by some, but long experience has demonstrated that it is not injurious to the wheel—some of the old, experienced carriage-makers recommend it. Remove part

hub in the wheel. This is not the case.

The contraction of the tire is greater at one place than the other. As a result, the spokes on one side of the wheel will bend more than upon the other, thus twisting the hub to one side. This same difficulty develops in tiring wheels with the modern cold tire compressor. Although the greatest care is observed by the manufacturer in the selection of the timber, with the view of having the spokes in each wheel of, as nearly as possible, a uniform strength, and while the structure of the timber may not show any marked difference, one spoke will stand more strain than the other. When the tire is compressed with the tiring machinery, or tired with the heated tire that is not uniformly heated, the weaker spokes will bend more than the others, thus twisting the hub to one side. The careful mechanic, however, can easily overcome this by watching his operations and, if necessary, by hammering out some of the contraction on the over-dished side of the wheel.

In large factories, where a modern heating oven is used, where the tire can be heated uniformly and where it can then be compressed on the wheel with the tiring machine only tight enough to give it a holding power on the rim, permitting the natural contraction of the tire to give the wheel the proper dish, and where the facilities are good and special mechanics are employed for the work, the tiring is done as a rule without injury to the wheel and in a way that secures very nearly uniform dish.

(To be concluded)

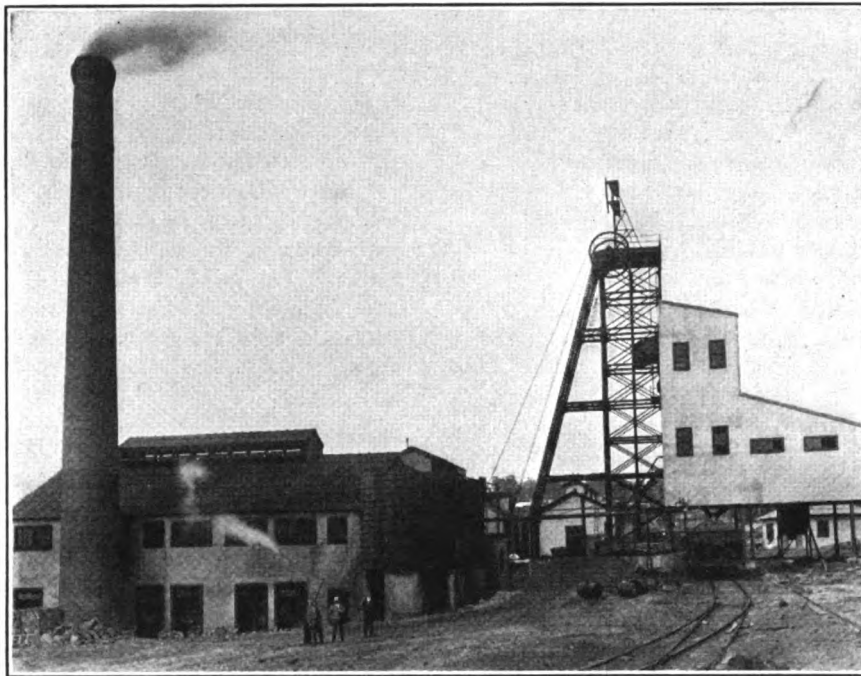


FIG. 5—SHOWING THE ABOVEGROUND WORKS OF A SOFT COAL MINE

Sudden heat must be avoided. Store rooms for wheels should never be heated above sixty-five to seventy degrees.

If the wheels are received without a coat of priming on them, they should remain in a room of this temperature for at least ten days before priming; and after they are primed, they should be allowed to season for at least ten days before tiring them. The old rule was never to put the tire on a wheel that had not been primed until kept at least three months in a moderately heated room. If the primer is placed upon the wheels at the wheel factory it is absorbed very rapidly, by reason of the proper condition of the wood to receive it, the moisture is excluded, and wheels of this kind if on the road from eight to ten days could be safely tired within two or three days after receipt.

of the end of the spoke, so that it will be slightly below the surface of the thread; do not cut out too much or water will settle under the tire, and the tenon and rim will soak and swell, causing the rim to split and the rim and spoke to rot in a short time. If cut out too much, so that the spoke has no bearing whatever upon the tire, the spoke shoulder settles into the rim, and the wheel very soon becomes worthless.

Tiring

Methods of tiring are as varied as the ideas of the smith and the conveniences of the shop. In small shops, it is difficult to give the tire the same heat throughout. In that case, the contraction is not uniform and a twist is given to the wheel that does not work itself out until the tire becomes loose. This twist in the wheel is frequently mistaken for a crooked



Queries— Answers— Notes

On Interfering and Toe Clips.—In reply to Mr. Ernest Finley's remarks on interfering I would like to ask him what he does in extreme cases when his remedies fail?

It may not be very comfortable for the horse to have one side of the foot higher



than the other, but it is much better than to have an animal wear all the hair off of his ankles and go very lame. I believe that raising the inside of the foot will prevent lameness. I do not always cut the outside of the hoof lower than the inside, but make it level and then raise the inside of the shoe, which amounts to the same thing.

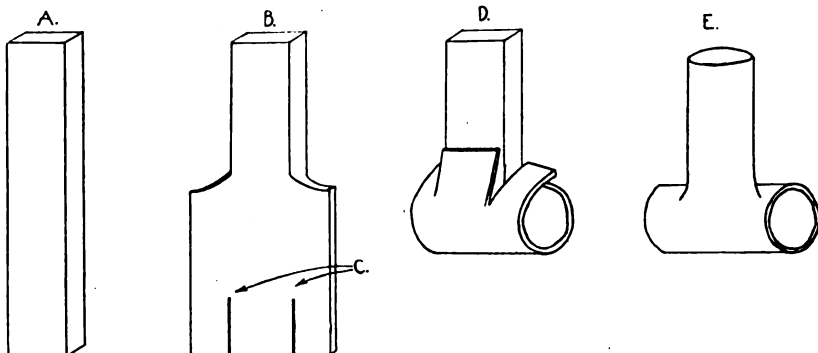
Sometimes a three-quarter shoe is a sure

necting rod for a mowing machine, and as my method is somewhat different it may prove of interest to them.

Take a piece of square stock of suitable size for the job required, such as A in the accompanying engraving. Flatten down the end to the width of the eye wanted and thin the end for welding, as at B. The end is then split the width of the square stock,

trade near Hamilton, Ont. I did journeyman's work up to 1870 and then started in business for myself near Owen Sound, and continued in business until 1907 when I sold out and went to Port Arthur, Ont. From there I went to Saskatchewan and took up my home.

I work occasionally in a little shop we have on the farm and also do a little shoeing at odd times. I can assure you I have experienced a great many ups and downs in my day, but managed to live through all and am now 78 years old. I have



MR. POPE DESCRIBES STILL ANOTHER METHOD FOR BARREL EYES

remedy for interfering, but I don't like this, because it leaves the inside quarter unprotected. (It seems every remedy has its faults.)

In regard to the toe clip on a shoe, I consider it very necessary, because it holds the shoe in place. They are not always placed on the toe, as some hoofs are badly turned over or crooked, and it is very necessary to clip the shoe on one side or the other in order to keep it from slipping. I have used as many as three clips on a shoe where the horse has a quarter crack, so as to relieve the weight on the affected part. Without the clips the shoe would soon loosen, and it is almost impossible for the shoe to remain solid in some cases.

I would like to ask some brother smith for a remedy for a horse with weak ankles. I have a driving mare, four years old, and the right hind ankle sometimes turns for-

as at C. The long part is rolled up on a pin, the lap resting on the square part, as at D. The laps are fitted for welding, and after getting a good heat are welded with a swage. The hollow, F, is rounded out carefully with a pin and finished, shown at E. This is an eye that is quickly made and will not break.

Regarding Brother Bond's difficulty with an ugly horse, I would suggest placing him in a horse stock when he is being shod and not take any chances on having him injure himself or the shoer. I think a man's life and limbs are worth more than the best horse that ever trod.

H. N. POPE, Connecticut.

A Nebraska Power Shop.—I am sending a picture showing the interior of my shop. I have been located here for twenty-eight years and have an up-to-date equipment. I do all kinds of shop work and repairing



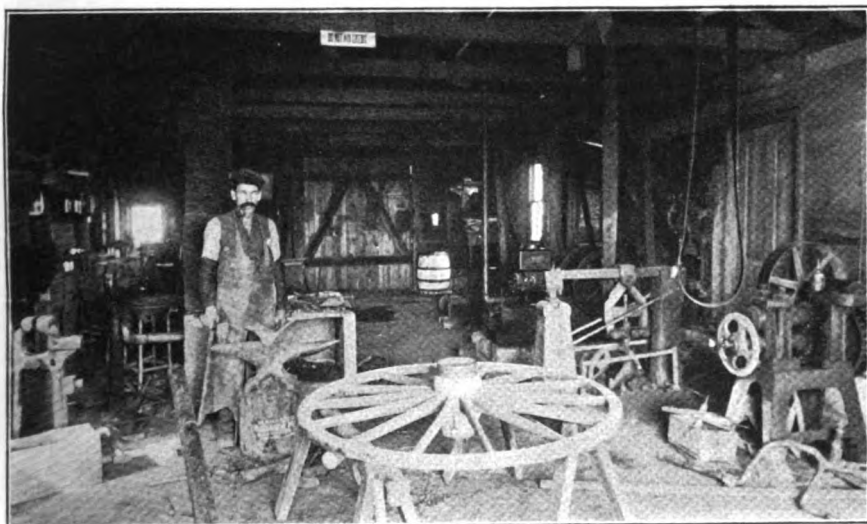
MR. MCKENZIE IS A VETERAN OF THE CRAFT

taken THE AMERICAN BLACKSMITH since I first heard of it and still look for its arrival with much interest.

The accompanying picture was taken on the street in Port Arthur.

DONALD MCKENZIE, Canada.

Another Accounting System.—I have read my numbers from cover to cover and find them most interesting and instructive. Without singling out Mr. Ralph Bowden's article on "Bookkeeping," for special praise, I really think it a system that could be adopted to advantage by most of us. Too many smiths are lax and careless in the keeping of accounts, and this brings to my mind the case of Dick Pritchell who ran a smithy in the little New South Wales town that has the privilege of being my birthplace. Dick was a top-notch tradesman, but his education had been somewhat neglected. His method of keeping books was simplicity itself, and its simplicity was equaled only by its inefficiency. He had a slate for the shop and a book at the house. His intentions were to jot down the work done during the day on the slate, take the slate home at night and copy the items into the book. But he invariably forgot to take the slate home, and as both sides became filled up, Dick shuddered when he saw the nerve-racking literary task that lay before him. And to keep the job at a distance as long as possible, he would go on scribbling work on the backs of old envelopes and odd scraps of paper, and stuff them into his pockets. When the end of the month came he had to start and sort out the scraps of paper and translate his own half-obliterated handiwork into English; his wife found it expedient to round up the



MR. ROBINSON'S SHOP OF NEBRASKA IS RUN BY POWER

ward, which causes her to walk lame for a short time after.

E. G. MENKE, Nevada.

Barrel Eyes—Fractious Horses.—I see that one of our Australian readers gives his method of making barrel eyes, in answer to Mr. Gretton's inquiry on making a con-

of automobiles and gasoline engines. Prices here compare with prices published in THE AMERICAN BLACKSMITH, and I have a good business, as the picture of my shop indicates.

J. G. ROBINSON, Nebraska.

A Canadian Veteran.—I was born in 1835 and when 20 years old started at my

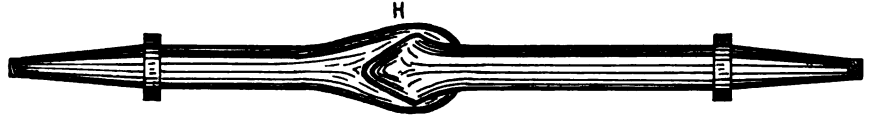


children and spend the evening at a neighbor's. She explained that "The language Dick uses when making up them bills ain't fit for no Christian to hear," and she for one "wouldn't be surprised if it didn't bring a judgment on him yet."

A tramp was the means of bringing Dick's system to an abrupt termination. The slate was full and paper scarce; the top of the bellows with a piece of chalk on it offered a tempting substitute, and by crowding a bit as he came down toward the nozzle of the bellows he managed to enter up a couple of weeks' work there. Then the above-mentioned tramp happened along about lunch time. "Any harm to bile my billy can on your forge, Boss?" "Bile away," said Dick and went home. When he returned, the visitor had disappeared and so had the chalk ledger. The tramp after boiling his billy, sat on the bellows, opened up his dinner, and ate it. And as Dick remarked after stopping for breath when his first outburst of profanity was exhausted, "The blasted fool must have squirmed all

I patiently awaited the race, as I was anxious to see and know the result of my ideas of shoeing. The day finally arrived, and when the race was over I went out to the track and examined the horse I had shod, and much to my surprise he hadn't struck a hair. I called the driver's attention to the fact and he congratulated me, saying that it was the first time he had

We don't get much shoeing here, but here are some of the prices: Mules, £1 (\$4.87) per set of four shoes; horses, 15s (\$3.65). We use no calks, no frost nails, and do no roughing, but we get plenty of tying—some 4 inches by 1 inch by 5 inches. I am greatly interested in brand-making, and a difficult figure is 8. I weld a ring on a rod as at A; I then get a heat



THE SECRET IS IN GETTING THE CORRECT HEAT

traveled so well for over a year. "But we pulled your shoes off and he hasn't any shoes on behind," said he. Of course that lowered my reputation about 99% and I concluded that I didn't belong to the "scientific" class of horseshoers. I know now that I was just a plain shoer and knew absolutely nothing about shoeing a horse for the tracks, which I believe is a study in itself and a very hard one. Well, that was several years ago, and then my ambition was to become a shoer of good average ability, so I commenced a study of the horse's feet.

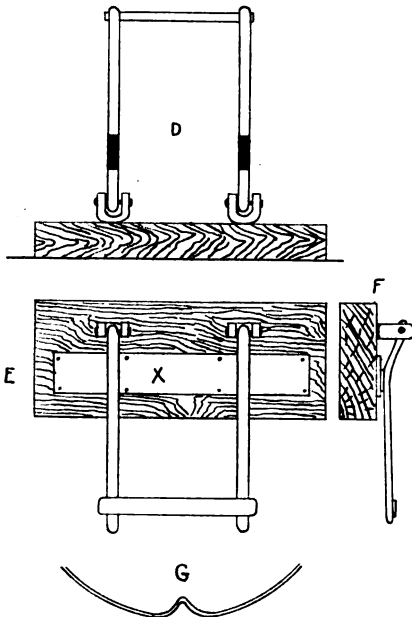
J. DENBO, Maryland.

English Tales—A Brand—A Tire Shrinker—Axle Welding.—The African farmers seem to be the same as the American, and I have many a laugh when they rope us poor iron punchers in. One here who is a millionaire, and who cannot count his cattle, recently wanted some four-inch pipes drilled for fence poles and I told him 6d (12 cents) per hole. He knocked me down to 4d (8 cents). Then he wanted two opposite holes to count as one. So I suggested that he cut the pipes up so as all the holes came in one line and they could all count as one. He then came outside to the machine, a small Buffalo drill bolted to a tree, and took my breath away by asking how much reduction would I make if he stood out in the boiling sun and turned the machine himself—and he a millionaire with so many cattle he cannot count them.

The next young gent borrowed a Scotch cart for three days and said he would give me a bag of onions for the hire of it. He returned it in three weeks by a native with a candle box half full of onions. He'll dodge me for the next six months. Some are beauties here.

I had a shop in London some years ago; my brother and I made a small iron forge with a pan underneath for a street corner parson. He asked my brother where he could get some bolts, and he replied "At Dickey Woods", you can get anything there." The parson turned up the whites of his eyes and said: "Can you get Eternal Life there, my friend?" My brother's helper, a small, sharp cockney lad, replied: "No, guv'nor, but you can get the 'Sporting Life' next door."

I heard another yarn in London. An old fat man with a leather apron on went into a shop and asked the smith if there was a job going. The smith said: "Better see the boss." The old man, who was also a smith, saw some 7/8-inch round stays on the ground just finished, so he inquired of the smith, "What are they, cast?" The smith said "No." "What are they, then, counter-sunk?" "No." "Well, what the ruddy flames are they, then?" He finally answered: "Wrought iron, that is forgings." "Well," said the old smith, "a man needs a head like a ruddy almanac to know all these things."



round that bellows." He went up the road after the tramp, but didn't volunteer much information on his return. He seemed fully occupied rendering first aid to a nose that was rapidly assuming unwonted dimensions. After this little disturbance his wife was induced to take over the secretarial duties, much to the benefit of all concerned.

ARTHUR L. BELL, Australia.

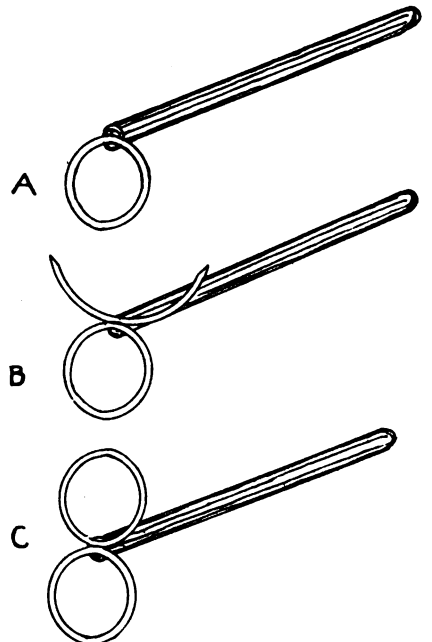
Hints for Horseshoers—A suggestion that may help other practical shoers is a kink that I discovered some time ago. When you attend the moving picture show, especially where the Wild West scenery is shown, get close to the stage so you can get a good view of the horses' feet while they are in action. These pictures will give you splendid ideas and pointers on shoeing.

I am a great believer in correcting faulty action for the limb in motion, and not when it is on the ground. For instance, one season I had a chance to shoe a swift trotter that was also a knee-banger and ankle-knocker. Of course, this was a bad case of interfering and I had to depend, a great deal upon my own judgment in fixing him up. I told the owner to drive him without boots (although I was uncertain of the result) and he acted upon my instructions.

on it where welded and another heat on a piece of flat stock; weld it to the ring and rod as at B, and then turn round and weld ends, and finish as at C.

I have a machine of my own invention—I call it "The poor man's hot shrinker." Take a block of wood, put on two lugs as at D in the engravings, and hinge a lever in each one after welding a piece of rasp about nine inches from lugs on each lever. The ends of the levers are connected with a piece of flat stock. To use, kink the tire as at G and heat the arch. Now place under levers, pushing down so that the rasps will grip on each side of the kink. Hammer kink down while hot, and smooth out on anvil. In the engraving, X represents a heavy iron plate upon which the tire is hammered.

I see a lot about the difficulty of welding the 1,000-mile axles; I can do them like shelling peas. I use just the ordinary scarf, but then I have been welding star bits for the last 20 years and these are cast steel. If any brother has any difficulty, let him try the scarf as shown at H; clip the two scarfs together as shown and allow to cool; then put into fire, and when hot hold a



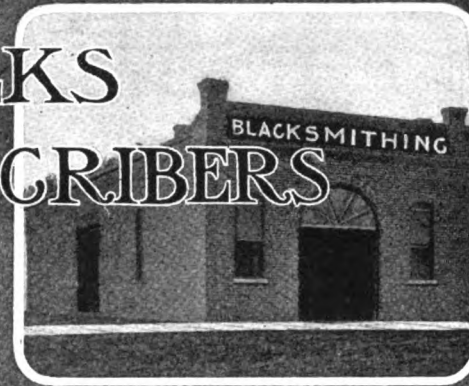
HOW A BRANDING IRON IS MADE

block of wood on one end of axle and strike the other end with a mallet. Before clipping together, jag the male scarf well with a hot set and let it cool; then clip the female on while well heated and see that it fits well, or the scarfs will open when knocking with mallet. These axles will weld any way if hot; the secret is in getting the correct heat. I use drillings and borax only.

HARRY BELL, South Africa.



TIMELY TALKS WITH OUR SUBSCRIBERS



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Shop Photographs

For that big annual Shop Number we always count upon the co-operation of "Our Folks" more than at any other time. We want shop photographs, shop layouts, pictures and descriptions of shop-made machines, and most anything else of interest to smiths from a shop point-of-view. So let us hear from you. Send a picture of your shop. If you haven't one send a floor layout of your equipment or a description of the tools and machines you have made for yourself. Do give us something. We've already gotten some very good things as starters, but we want more, so as to make this year's Shop Number the best ever.

Worth Five Times Its Price

In these high-cost-of-living days many things are being continually pointed out as being priced far above actual value. "It's worth the price"—folks say. In sharp contrast to this is the text of a letter just received. The writer of the letter, in requesting a certain back number of "Our Journal" to complete his file, writes: "I am willing to pay fifty cents for the copy if you can get it for me." That seems to indicate strongly that quite the reverse from being "priced too high" as are many things these days, "Our Journal" is marked entirely too low in price. When a man offers to pay five times the actual price of anything it must surely be worth the price asked for it. How much do you consider "Our Journal" worth to you? It really costs you only one dollar a year (\$1.25 in Canada or 6 shillings in other countries), but what do you consider it worth in actual money-making value?

Subscription Agents

When a stranger solicits your subscription to THE AMERICAN BLACKSMITH, or any other publication, insist upon his showing you absolute proof that he is an agent in good standing and is employed by the publication which he represents. Don't, under any circumstances, give the man your money if you are not sure that he really works for the paper he says he does. No matter what the man offers you—no matter what price he makes—no matter what premium he promises to send—DON'T GIVE HIM YOUR MONEY IF YOU ARE NOT SURE.

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A Look Ahead

This number, featuring horseshoeing, will be followed by a Business Methods Issue. And while we have, as you know, published some real eye-opening articles on business, business methods and systems, you'll find more material in the May number on the subject of business than you've ever had before. There's going to be a story of a price-cutting fight in which a Scotchman with a quality-price schedule wins out in a most unusual way. When you read it you'll wonder if it really happened. Of course it—well, just read it in the May number and judge for yourself. It will be a new inspiration to you—it will show you that a one-man fight isn't always hopeless. Then there will be other articles on business—down to brass-tacks—hard-as-steel business facts. There will be several distinctly new ideas in bookkeeping and accounting, and you won't want to miss them.

And while on the subject of future numbers, allow us to give you just a tip about our annual Shop Number. We're already preparing material for that big annual affair and, to say the least, it's going to be a "humdinger" as Thornton says. By the way, Thornton has taken a contract for that issue that, if it doesn't result in his early hanging with full rope ceremonies, will at least cripple him for life. Watch, wait and listen for that Shop Number for July.

The Prize Contest

If three anvils of different makes were set before you with no names appearing on them and you were asked to choose the best, would you be puzzled? Suppose you found them all of practically the same shape, of about the same clear ring and of apparently the same good quality, you would find it very difficult to make a choice, wouldn't you?

That was just the situation that stared the contest judges in the face. After the most difficult task of elimination and selection, three manuscripts stood out as being best. And to pick the best of these three was an impossibility. It was therefore suggested that the first prize be divided among the three writers submitting these letters, and awards have been made accordingly as follows: Checks for sixteen dollars and sixty-seven cents to each of the following: F. A. Jacobs, Ohio; J. G. Sparks, Va.; G. N. Sidders, Ohio. Gold watch to J. H. Phillips, Mass., and a fountain pen to each of the following: C. A. Stebbins, Jr., Kan., and C. D. Briddell, Md.



Jack Smith, fellow fine,
Can you shoe this horse of mine?
Yes, good sir, that I can,
As well as any other man.
Here a nail and there a prod,
And now, good sir, your horse is shod.



The Form and Standing Position of the Horse's Foot and Leg in Relation to the Animal's Gait

J. C. WEAVER

TIMES almost without number has the shoer been instructed and advised to "watch the horse in motion, examine him at rest, study his conformation and then let these observations guide him in the shoeing of the animal." This is, of course, good advice, but how should the shoer be guided by these observations? Comparatively few shoers, in the writer's experience, appear to really understand the relationship between the conformation of the limb and the gait of the animal.

In the accompanying diagrams the writer has attempted to show how the foot acts in motion when a certain form of foot and limb is observed. In explaining these various forms and flights of the foot it may be well to say just a word on the relation of the foot to the limb above it.

The form of the foot depends upon the position of the limb above it. A straight, regularly formed limb will as a rule have as a base a regularly formed hoof. On the other hand, a crooked limb will usually be accompanied by a crooked foot.

The degree of deviation from the straight line of the regularly formed foot and limb depends upon the lengths of the leg and foot bones and the angles at which they meet one another.

This combination of varying bone lengths and angles of articulation produces the positions known as "base-wide," "toe-wide," "pigeon-toed," "knock-kneed," and the numerous other positions of the foot and leg usually designated by some title according to the degree of deviation from the straight, regularly formed foot and limb.

Now, how is the flight of the feet affected in the various positions?

The writer has attempted to illustrate this by means of the accompanying diagrams. The standing

position of the feet is shown in connection with their flight while in motion.

At A, Fig. 1, is shown the straight, regularly formed foot. When the animal is possessed of straight, normal limbs, a plumb line dropped from the point of the shoulder will divide the limb exactly in the center and meet the ground exactly in the middle point of the toe. The toes of such feet point directly straightforward, and the foot in flight is carried in a

straight line just as the toe points.

At B, Fig. 2, we have what is usually known as the toe-wide position of the feet. With this standing position an imaginary line will drop from the point of the shoulder to the ground, meeting the hoof at a point somewhat to the inside of the middle of the toe. The entire section of limb between the knee joint and the fetlock joint usually comes inside the plumb lines, while the knee itself is merely touched on the outside by

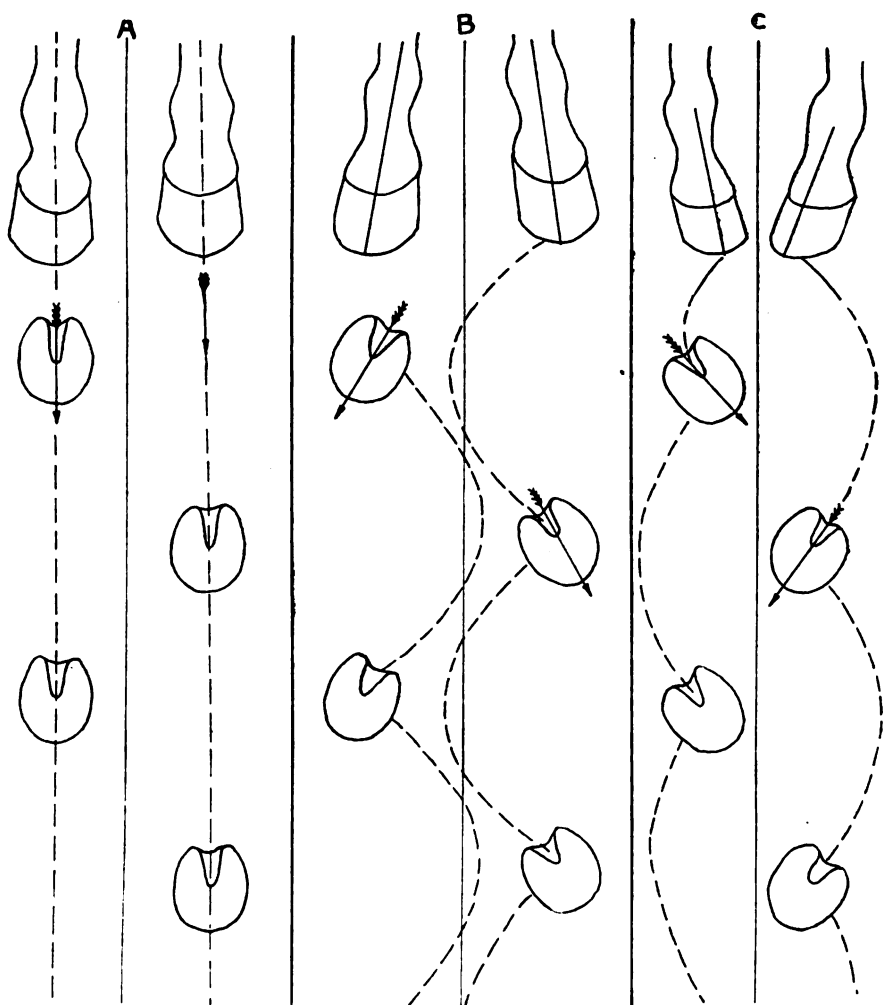


FIG. 1—THE FLIGHT OF THE FOOT CAN USUALLY BE FORETOLD BY THE STANDING POSITION



the line. In this position the center-line of the feet deviates at an angle dependent upon the degree at which the feet toe out. The feet in flight are prone to interfere; the foot taking a course in toward the body and then swinging outward and away from the center line of the body.

At C in Fig. 1 we have the pigeon-toed position. Here the entire hoof and foot are inside the plumb line; the toes pointing toward each other. The feet in this case swing outward in flight and around each other. If you will observe the flight and action of horses running toward you, you will generally find that this outward swing takes place from the knee down.

In viewing an animal from the side, various degrees of deviation from the normal slant of the foot will be observed; and upon this degree of slant will depend in great measure the gait of the animal as viewed from the side.

To illustrate, see the diagram, Fig. 2, At A; here we note a normally formed foot and hoof. An imaginary line running the length of the long pastern, the short pastern and the foot bone will meet the ground line

of the hoof at an angle somewhere between 45° and 50° . This foot when in flight will travel about as shown by the dash line at A—leaving the ground at an angle somewhat less than the angle of the foot, and attaining its highest point right at the center of its flight.

At B, Fig. 2, is shown the flight of a stumpy foot, one with an angle greater than 50° . This foot you will note, breaks over easily, travels gradually upward and attains its greatest height when just about to descend, which it does quickly and with little forward movement.

At C., Fig. 2, is shown an acute-angled foot in which the angle is less than 45° . This foot usually begins its flight just opposite to the action taken by the stumpy foot, that is: the foot is lifted up sharply from the ground, attaining its greatest height quickly, and gradually descending until again at rest.

Of course there are other factors that bear upon the flight of the foot and the action of the limb, but the foregoing will show how strongly the action of the horse is governed by the conformation, position and form of the foot and leg.

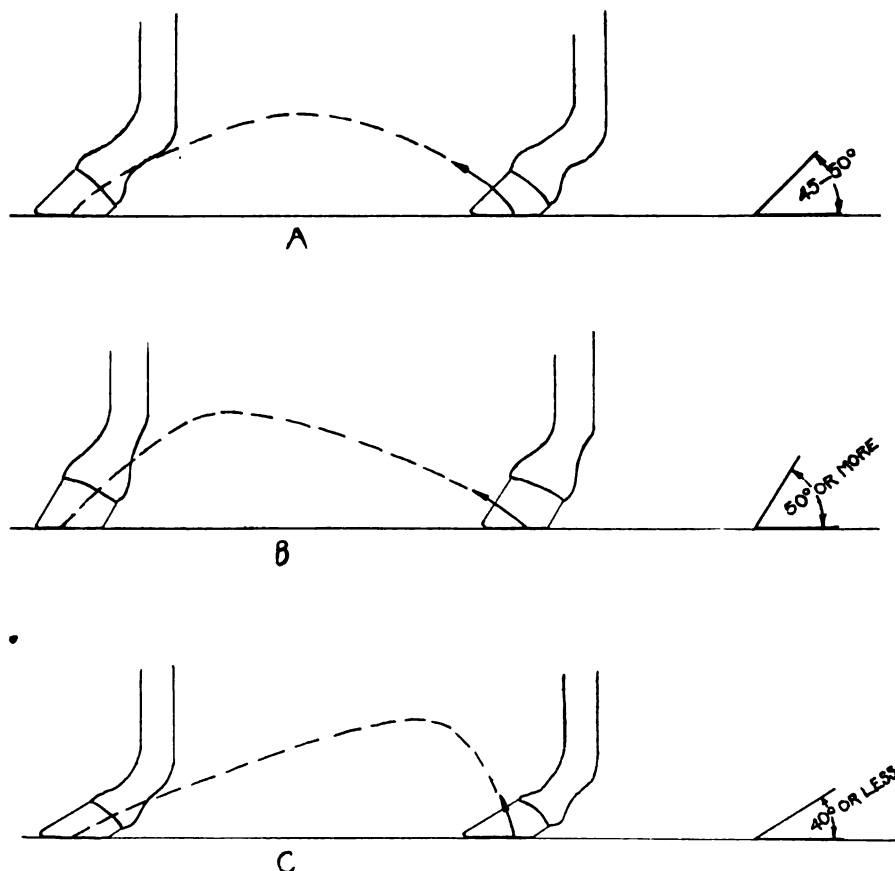
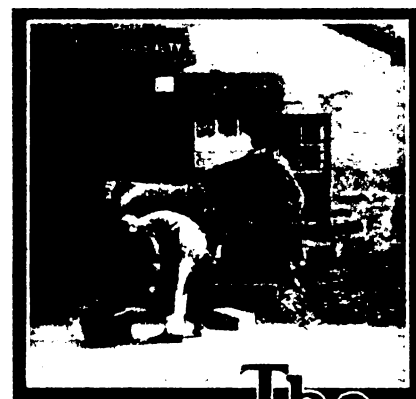


FIG. 2—HOW THE ANGLE OF THE FOOT AFFECTS THE FOOT ACTION



The Horseshoer

Horses: Their Number and Value in the United States

Ever since the advent of the automobile, there has been a very considerable amount of discussion and debate regarding the number and value of horses in the United States. In an attempt to get at the real facts of the matter, and to show conclusively just what the real true figures may mean (if they mean anything at all in this instance), the writer has called to his aid the department of statistics at Washington, with its unlimited facilities for gathering and compiling figures upon every conceivable subject.

Whether or not a consideration of the number of horses in the United States indicates anything, is a question. It appears to the writer that other things must be taken into consideration of the subject. For example, we find that, according to the best figures and sources of information obtainable, there were but 5,401,000 head of horses in the country in 1867. And the value per head at that time averaged \$59.05. In 1913 the horses numbered 20,567,000, at an average of \$110.77 per head. And all along the column of dates from 1867 to 1913 we find a steady increase, with one or two exceptions, both in numbers and prices.

"There," says the horseman, "horses are increasing—there are more horses, they are higher today than ever before, and all of this in spite of the automobile."

Now, is that a fair conclusion? With all due respect to the horse and horse interests?



Suppose the automobile had never been invented and manufactured—what then? Would the horses have increased still more in value and numbers?

Just consider how wonderfully the entire country has grown in the past fifty years. Consider how business has grown and developed in the past twenty-five years. Would not the automobile have had to come into use almost universally to have made any impression on the number of horses used?

Suppose then we consider the number of horses per capita, according to the census since 1850. In 1850, with 4,336,719 head of horses, the per capita number of horses was .19 of one animal. In 1880 there was .21 of one animal for each person according to the population. In 1890 this figure went to .24—in 1900 it was the same, and in 1910 it decreased to .22, and in 1914 it is estimated that there are .21 of one horse per person.

Doesn't this seem to give us a little more real basis for figuring on the horse and horse popularity? And while it may point the wrong way as far as some of our interests are concerned, is it not well to look at the matter in an unprejudiced way, full in the face as it were, and be guided accordingly?

Conclusion

When the bicycle increased so rapidly in popularity, it was said time and again that the horse would be considerably displaced by the little pedal machine. When the era of electric traction came, the same rumor spread; and now with the automobile, "the horse is rapidly being pushed toward extinction," according to the automobile interests.

In spite of everything, bicycle, electric cars, increased steam road mileage and the automobile, the horse has steadily increased in number and value.

And while horses are maintaining and increasing their numbers, the relative importance of breeds is changing. The automobile seems to have diminished the number of light driving horses, and despite the increased use of the auto-truck, the number of draft horses has much increased. The prairie ponies—those one-time indispensable adjuncts of the west have been superseded by the better-bred horse. In Texas, for

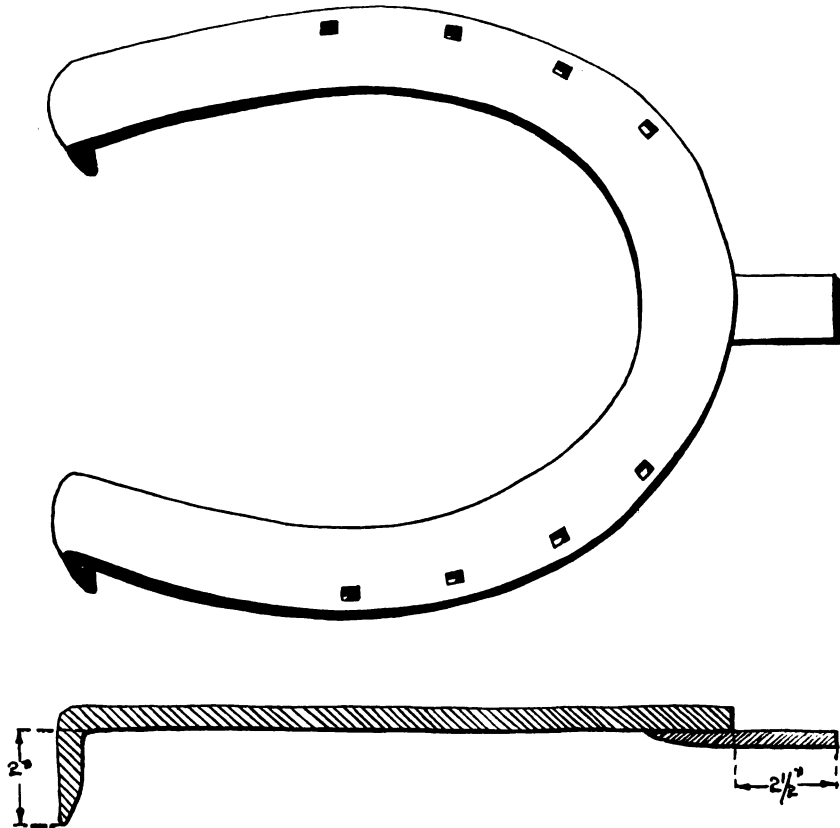
example, these ponies have been mostly eliminated with the disappearance of ranches, and the development of agriculture which demands horses of better blood and higher value.

On the other hand there is a decline in the number of horses in

A Case of Knuckling That Proved to be Incurable

FRANZ WENKE

[EDITOR'S NOTE:—An article dealing with horse treatment and disease usually describes how a certain method succeeded in accomplishing a much desired result. Occasionally, however, there are cases where



THE SHOE USED BY MR. WENKE IN HIS TREATMENT FOR KNUCKLING

California; owing to an unusually extensive and general use of automobile trucks and tractor engines.

Considering the entire case presented, there is no occasion for alarm regarding the horse and horse interests. The horse will continue to fill a big need for some time to come. The animal will continue for some time yet, as a necessary part of the equipment in many lines. And in some instances, as at present, will ever be the best means of haulage and transportation.

On the other hand, the automobile and motor truck will both continue to advance, where their economy is apparent, and it behooves the general smith to get into the auto-game—not because the auto is going to put the horse out of business, for it isn't, but to get the profit and the business that rightly belongs to them.

failure displaces success; and while we do not attain the result we desire we must not completely disregard our failures, but learn through them. Mr. Wenke tells of "a failure," as he calls it, in treating a lame horse, and presents it to the thinking, practical shoer.]

About the beginning of September I was called to look at a horse that was lame in his right hind fetlock or pastern. The horse weighed about 1400 pounds. He was standing with his foot off the ground most of the time, and when compelled to put the foot down he would completely knuckle over. It was impossible for me to locate the cause of the injury, or when it happened, previous to my seeing him. However, I concluded that the horse in question must have stepped on the brink of a hole, knuckled over completely into it, and at the same time must have severed the connection of the front extensor tendon and the pyramidal process, and very likely the whole semilunar crest. I



immediately applied a high heeled shoe, with an extension of $2\frac{1}{2}$ inches in front of the toe, as shown in the accompanying engraving.

I used the high heel in order to give the horse some rest in the afflicted region, as he was unable to place his foot on the ground at all. The front extension was to prevent knuckling over. The rest of the treatment consisted of actual cautery (pyropuncture) and a powerful cantharides blister (Spanish fly). At first, the horse seemed to improve, the knuckling over was diminishing, but still I could not get the heel down to the ground. In the morning when I brought the horse from the stable he would scarcely put his foot on the ground at all, but hobbled along on three feet. However, after a little exercise, it seemed to get somewhat better, and in the evening when he was brought in from pasture he walked fairly well. The following morning he seemed to be right back to the same poor status that he was the day before. After two and a half months of treatment I returned the horse to the owner as incurable. By that time I had learned that the horse had been injured about three months prior to my seeing him and had simply been turned out to pasture without any treatment at all. Of course, had proper care been given when the injury occurred, I am quite sure that a cure could have been effected with perhaps a single treatment.

Treating and Shoeing for Cross-Firing

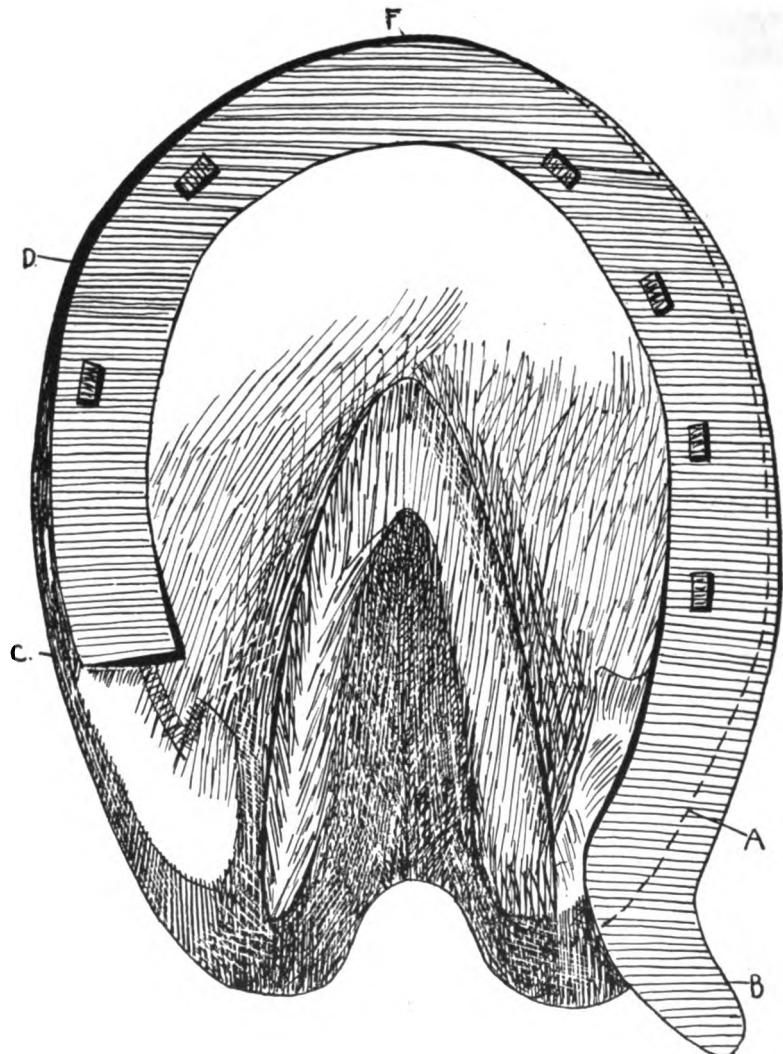
H. G. CARTER

In shoeing the animal that cross-fires, the problem is to pare and shoe a base-wide fore foot, so that it will break over nearer the center of the toe, and to pare and shoe a base-narrow hind foot to also break over nearer the center. The front hoof should be relatively low from the middle of the toe around to and including the outer buttress. If the inner half of the wall is not long enough, it must be raised above the outer half by applying a shoe which is thinner on its outer than on its inner side. The inner toe should be left long. The shoe should be light and without heel-calks. It may carry a low, curved grab or calk, running from the second inner toenail to the center of the toe. The inner branch

is fitted flush with the wall from the center of the toe back to the quarter, back of which point it gradually extends beyond the wall, that is, fitted full; and stops well back of the buttress. This inner branch should be from $\frac{1}{4}$ to $\frac{3}{8}$ inch longer than the outer branch. The long inner branch, full at the quarter, is desirable, but must be covered by a quarter-boot, which a cross-firing animal should always wear.

The outer branch should be fitted snug and stop at the buttress. From the center of the toe to the end of the branch the ground surface should be beveled from the inner edge of the

The inner branch may terminate in a knife-edge midway between toe and heel, as at C in the engraving. The inner branch is fitted snug from the center of the toe to its end, and the ground surface beveled from the inner edge of the web to a knife-edge at the outer border. The outer branch is to be fitted very full from the outside toe to the end; the dash line A showing the edge of the hoof. This branch should extend well behind the buttress, and in well-marked, base-narrow hoofs should be turned outward, in order to support the overhanging coronet of the quarter. The outer border should be beveled base-



A SHOE FOR THE TREATMENT OF THE ANIMAL THAT CROSS-FIRES

web to a knife-edge at the outer border.

The hind hoof should be low from the center of the toe around to and including the inner buttress. If the outer half is too short, it must be raised above the inner half by applying a shoe with a thin inner branch.

wide and the nail holes punched coarse (far from the outer border). The outer branch may carry a small heel-calk. In the engraving D shows the edge of the hoof. From B to F the shoe is of even thickness and from F to C it gradually thins to a feather edge.



These pointers will probably assist Brother A. E. Smith and others who appear to be having difficulty in treating and shoeing the cross-firing animal.



Machine and Tool Smith

The Bonus System at Williamson Free School of Mechanical Trades

THE TRADE BONUS PLAN, a brief outline of which is presented, applies to Juniors and Seniors.

About 50 per cent of their shop exercises, both abstract and concrete, are worked on an estimated time basis based on a journeyman's time. When the pupil is assigned a task, the estimated time allowance for the operation is stated.

During the first six months of his Junior year he is allowed 20 per cent more than Journeyman's rate.

During the second six months of his Junior year he is allowed 10 per cent.

During the first six months of his Senior year he is allowed but 5 per cent.

During the last six months of his Senior year he must equal young Journeyman's time.

When he falls within the estimated time he is given a bonus credit. If he works to the even estimate he stands even. If he exceeds the time he is given a deficit grade.

If he comes out even in the majority of his estimated time exercises, he is allowed the regular time for the holidays. If he makes a bonus credit in the majority of exercises, he is allowed an extra half day to each of the short holidays and a full day to the long ones. If he makes a deficit

grade, he is detained a period corresponding to the one allowed for bonus.

ACADEMIC BONUS PLAN applies to all classes:

If the pupil's daily recitation grades and all examination grades exceed that of "Good" (which is over 80), he earns a bonus academically. If his grade is "Fair," that is between 70 and 80, he stands even; if below 70, he has earned a deficit, and the same allowances are made for the work in this department as for that in the shop departments.

DEPARTMENT BONUS PLAN applies to all classes:

If the pupil's deportment record is absolutely clear, he is allowed an additional half day to each of the shorter holidays and a full day to the longer ones.

It is possible for the pupils to earn one or all of the bonus credits. If they qualify for bonus in the three branches—shop work, academic work and deportment—they are allowed an additional credit of a half day, whereby a pupil whose record is high grade in all respects, may earn two additional days for his Thanksgiving, Easter, Decoration and Fourth of July leaves, and four full days for Christmas holidays and the August vacation.

The bonus period covers the time between stated holidays.

The Class of 1913

The first class consisting of 58 members working for two full years under the bonus system, completed their apprenticeship on March 29, 1913. On November 1st, a letter and a list of questions were sent to each of them and we had a direct reply within five weeks to each of the 58 letters sent out.

The class consisted of:

- 12 Bricklayers
- 15 Carpenters
- 8 Engineers
- 13 Machinists
- 10 Patternmakers

Their average rate of compensation is \$18.03 per week. They are employed in nine States, in thirty-six different cities, towns, etc., with forty-six different employers.

51 engaged in trade work.

- 6 in occupations for which their trade training fitted them.
- 1 not working at his trade.

Prior to the introduction of the bonus plan, the best average weekly rate of compensation of a class within 6 months after graduation was \$16.60.

Hardening Iron

L. R. SWARTZ

In the February issue I notice the request of Mr. W. W. Egley for a formula for hardening iron, stating also that he had heard of iron being hardened sufficiently to cut iron. Such has been the case with some of the methods employed by some of the old time smiths whom I knew when a boy.

One smith, Daniel Powell of Pleasant Hall, Pa., made many sets of pump irons for my father during the latter part of 1870. While other smiths used cast steel for the bearings, Powell used nothing but iron, and successfully hardened all of the bearings. His irons were superior to the steel-finished irons, in that the bearings were of a uniform hardness and there was scarcely any wear to be observed after having been used for years. I remember a small chisel which he showed me, made of the nail rod stock in use at that time for making horseshoe nails, and I have seen him cut off tire bolts with it.

His method of hardening pump irons was to collect the raspings and small chips of horn from horses' hoofs and to mix it with about two thirds the same amount of fairly fine salt. He then raised the iron to a good heat and worked it around in the salt and horn mixture until it made a good crust over the iron. He brought the iron to a white heat and quenched it in the slack tub. A file would not catch on it after the iron was hardened, and the surfaces showed but little scale.

When at Salem, Va., I was acquainted with one of the men who had worked in the arsenal of the Confederate Government at Richmond during the war. This man did all kinds of light repairing and gunsmith work, and usually made his gunsprings of nail rod. I was unable to find out the process he used, as he seemed disposed to keep it a secret.

I have never carried out any experiments along the line of drawing the temper on casehardened work, but believe that on light pieces it can be done. My knowledge of the process of hardening iron is to convert



the surface, for a depth, into steel and then quench, to harden. Now, if the iron had been sufficiently and properly worked under the hammer to close up the pores and give it a close, even grain, I see no reason why, after being hardened, the temper cannot be drawn on their edges as in other steel tools—both being carbon steel. Old time gunsmiths used to make every part of the locks of the muzzle loaders they turned out, even making the nipples, to receive the caps, out of iron. They made them in lots and hardened a batch at a time by packing them in a sheet-iron box with salt and leather shavings to carbonize them. Many of these methods have fallen into disuse since improved machinery has taken the place of the old time hand craftsman. Nearly all of those old workmen were of a secretive turn and kept their processes of hardening, tempering and smelting to themselves.

Entrance Gates, Hampton Court Palace, London

J. Y. DUNLOP

The accompanying photograph shows one of the main entrance gates at Hampton Court Palace which was the royal residence for many centuries. The design is eminently suited for wrought iron, and combines many of the good points of old wrought-iron work. Close examination shows the careful thought which must have been given to detail. From a commercial point of view the gates are of a practical construction, and have withstood hard service. The main gate is in halves, hinged at the top and bottom to a wrought-iron standard, built on a square skeleton, principally placed with its diagonals in line with the gate. At the sides are placed two small gates over which are placed a fixed screen with scrollwork. These gates are hung to the stone pillars, while the bottom is fitted into a special socket leaded to the stone template. Rollers are provided on the bottom rail of the large gates to prevent sagging. These run on quadrant-shaped tracks laid flush with the stone paving which forms the entrance roadway.

The art work is made of such material as the blacksmith uses, and was carried to great perfection at the time this palace was erected. The accompanying example is a graceful

and elaborate piece of work wrought out entirely with the hand hammer. We moderns are no doubt indebted for the countless examples of what skill and taste have done in the past to make our homes, churches and streets beautiful. Today the influence of wrought iron is to be found everywhere, and when this material is properly employed by the artsmith in ornamental forms, geometric and traced design we have a full feeling of refinement, besides the formation of a beautiful pattern that can be admired as long as it lasts.

In this particular gate at Hampton Court Palace the repeat ornaments are very fine, which tend to a richness in design. The center of each half of the carriage gate has some very excellent scrollwork which is finished in the center with the monogram of the then reigning king. Above the opening parts of this gate the screen is composed almost wholly of scrollwork in which has been wrought groups of acanthus foliage in exact spirals. This is one of the best foliages for decoration that the art-metal worker can use. The full advantage of its flowing vines, its beautiful angular lobes and the expression of

design is the pause points and junctions of the spiral which have been all modeled and finished with the hammer.

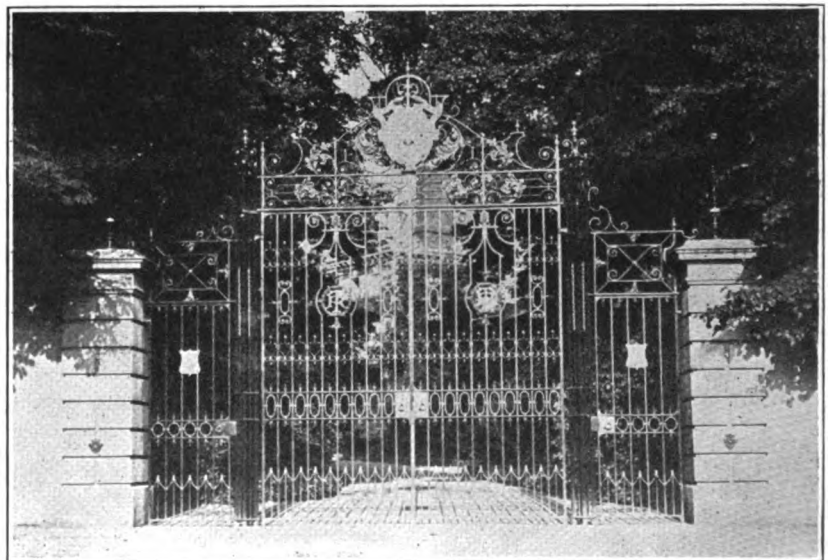
No finer examples of wrought-iron metalwork were ever erected than that at this palace, and it is said that the finest garden screen known was that set up in the grounds of Hampton Court in the last quarter of the seventeenth century, and now distributed through various museums in England.

The Electric Welder in the Locomotive Shop

JOSEPH GRINE

In common with many others our first experience with the electric welding was very disappointing and failures were many; so much so that at one time we came pretty nearly giving up the process entirely. But with the discovery of an error in the adjustment of our machines (which was corrected), marked improvement in results was had immediately.

At the shop with which I am connected we have two electric welding outfits which are operated day and night and we easily could find work



THE MAIN ENTRANCE GATES AT HAMPTON COURT PALACE, LONDON

the thickness of the leaves, are to be seen on the upper part of the gate. The use of this leaf for design is of ancient origin, the Greeks taking it almost entirely in their decorative sculpture, and it has never been surpassed for simplicity of structure combined with gracefulness of form. Another particularly fine point in this

for double our present capacity if we had it. In fact we would not get along without electric welding operations if we could. Perhaps the most remarkable results have been attained in the welding of locomotive frames.

At one of our shops there have been welded 102 broken engine frames. These breaks were located in almost



every conceivable place and on all sizes of power. So far we have not had a single failure. We believe it absolutely the easiest, cleanest and cheapest method we have yet heard of for welding frames without their removal from position. There is no expansion or contraction to contend with in making such welds, and at the completion the frame is absolutely in its original position and length. There is also a minimum amount of stripping needed, as welds can be made by this process which cannot be approached by any other known to us.

In frame weldings, the machines are adjusted to work at 147 amps. and 60 volts.

The frames are prepared for welding in exactly the same manner as for welding over a fire. That is, the break is cut V-shape by means of the oxy-acetylene machine; the oxidized surface left by the burner being then chipped off by an air hammer and chisel, so that a clean surface is presented for the electric welder.

The following is total cost of welding frames of three different dimensions:

Frames, 5 inches by 5½ inches	
Labor	\$5.63
Material	3.38
Total	\$9.01
Frames, 4 inches by 4½ inches	
Labor	\$4.01
Material	2.51
Total	\$6.52
Frames, 4 inches by 2½ inches	
Labor	\$3.03
Material	1.95
Total	\$4.98

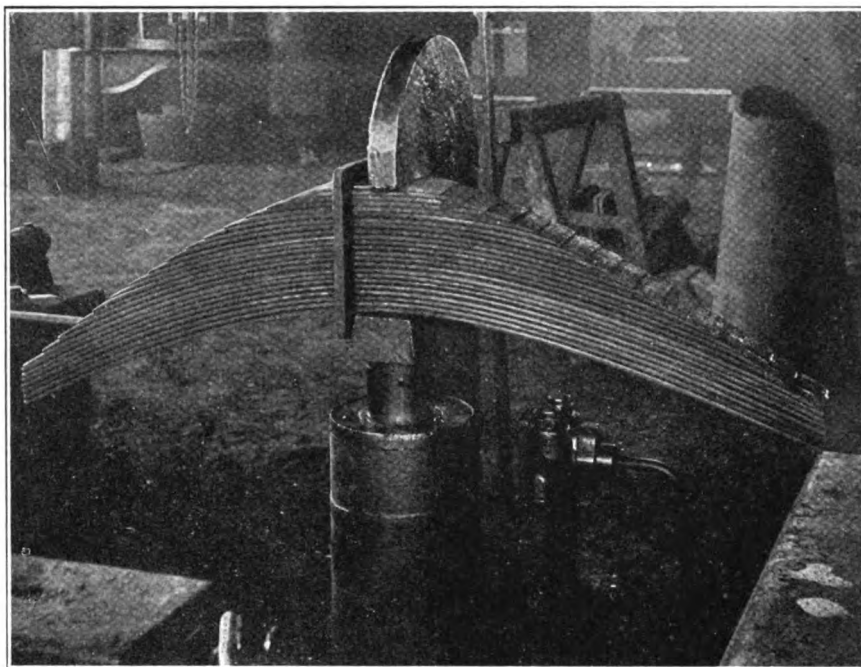
The material on all of the above costs includes, of course, oxygen used to prepare the frame, wire necessary for welding, as well as the cost of current used.

The process is also being put to many other uses besides frame-welding, such as welding firebox cracks and patches, welding flues into sheets, filling in wasted spots about boilers or fireboxes, filling in worn motion work, filling in frames that have been chaffed by spring hangers, plugging holes of all descriptions, such as butt ends of main rod, and rod straps where they have been reamed beyond standard size,

welding mud ring corners and cracked mud rings, etc.

As an illustration of its utility on firebox sheets there have been made at the shop referred to in a certain

leaves to hold them in place. The lever is then pushed back and the ram drops down, allowing the spring to be removed. A hot spring band is now put on and shrunk into place



HYDRAULIC SPRING ASSEMBLER, USED AT CHICAGO & NORTHWESTERN SHOPS

period 201 firebox welds, with only seven failures, or less than 4%, and those that did fail had an average life of 58 days before so doing.

Another item of large saving effected by the process is the filling up of flat spots on 46 locomotive driving wheel tires; these spots running in length from 2½ inches to 4½ inches.

It would, of course, have been necessary to turn these tires had it not been for the electric welder.

and the retaining band removed. The spring is then ready to be placed under a locomotive.

The Manufacture, Care and Use of Wheels—2

O. B. BANNISTER

Boxing

Axles and boxes should be proportionate to the diameter of the hub. When the wheel is boxed, the length of the hub tenon of the spoke should always exceed the width of the spoke at the hub. On light wheels and particularly in dodged spoke wheels the tenon should be one eighth of an inch longer than the width of the spoke; on medium-sized wheels, three sixteenths of an inch, and on heavy wheels, one quarter of an inch. In many shops it is the practice to put white lead upon the boxes before putting them into the hub. This is a serious mistake. Oily substances that reach the end of the spokes on the inside of the hub destroy the glue joints. The result is failure of the wheel, and the oil in the lead used upon the boxes is the beginning of this class of trouble.

A Hydraulic Spring Assembler

AVERY E. GRANVILLE

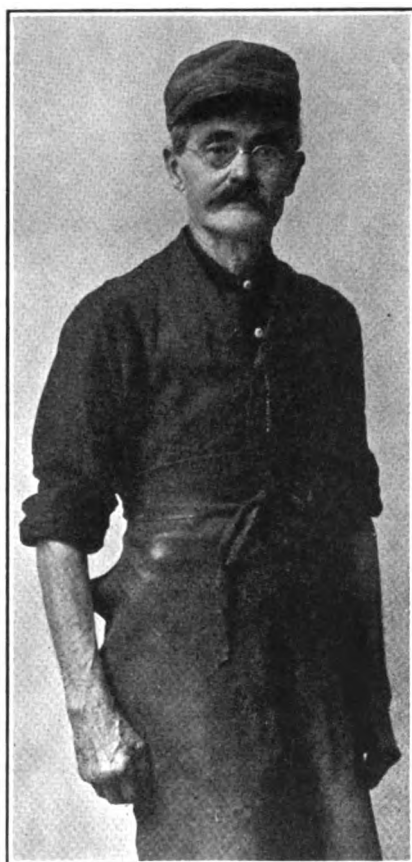
The machine shown in the accompanying engraving is used in the Chicago & Northwestern Railway Shops, at Chicago, for assembling locomotive springs. The spring leaves, after their heat treatment and tempering, are piled loosely by hand in the machine. When the required number of leaves are piled, the lever (shown just back of the large upper jaw in the picture) is pulled and the ram rises, compressing the leaves until a retaining band (as shown) can be slipped over the



Great care should be exercised in fitting the box tight into the hub, making it difficult for the oil or grease used to lubricate the axle to work in behind the box into the end of the spoke and thus destroy the wheel. We do not guarantee wheels with oily spoke tenons.

In the Paint Shop

Here, as elsewhere, care must be exercised in handling and in the character of the conditions to which the wheels are exposed. Do not pile them upon each other, so that the spokes and rims may be damaged by contact. Keep the wheels away from steam heating pipes or stoves. The action of the direct heat will cause the wood to shrink and the tire to expand, no matter how well the wood may be



JAMES A. BAUGHMAN, AN ART-SMITH OF MICHIGAN

seasoned nor how tightly the tire may be put upon the wheel.

To the User of the Vehicle, Caution!

After all of the care has been taken by the manufacturer of the wheels, and by the manufacturer of the buggy, to furnish you with an article that is as near perfect as mechanical skill and honesty of purpose can make it, and after it is in that condition that

it will give the user of the vehicle years and years of service, provided the vehicle is handled in a way that it should be, their usefulness can be completely destroyed in a very short time by his neglect to do his part by keeping the tire tight upon the wheel.

We are asked frequently, "How often should one have the tires re-set on their wheels?" We would ask such a one, "How often should you have a horse shod?" You would probably answer at once, "Whenever the horse needs it." We give you the same answer with reference to the re-setting of your tire. Whenever you take your horse to the blacksmith, to have his shoes re-set, you do not expect him to do his work for nothing, nor should you expect the carriage manufacturer to re-set the tires on your wheels without charge.

The tires on your wheels, when you buy your buggy, have as a rule been put on in the most careful and mechanical manner. This being the case, the responsibility of the manufacturer of the wheel and the manufacturer of the buggy ceases, so far as keeping the tire tight is concerned. When the buggy is delivered to the purchaser it is then up to the user of it to protect his own property.

The conditions with which the wheels upon your buggy have to contend while in service make the tires come loose sometimes in thirty days, or they may not come loose in two to three years, but when they do come loose it is as much the duty of the user and owner of the vehicle to have them re-set immediately, at his own cost, as it is to have your horse shod when his shoes are loose.

The nature of the material of which wheels are constructed (wood), and the nature of the material in the tire on wheels (steel), are directly opposed to each other, and men can not change them. The nature of the wood is to shrink and grow less in hot, dry weather. The nature of steel is to expand and grow larger in hot, dry weather. This being the case, in a hot, dry time, the tendency of the wood is always to contract and the tendency of the steel is always to expand. The result is loose tires, for it is impossible to keep the tires tight, provided the wheel is given any service during the hot, dry time.

There is a directly opposite effect in cold, wet, damp weather. The nature of the wood is to expand, and

the nature of the steel is to contract. In instances of this kind, the wheel will take on much more dish than it should have, and if the wheel is per-



SOME OF MR. BAUGHMAN'S ARTISTIC WORK

mitted to remain with too much dish it very often becomes worthless.

Now, in both of these instances, the responsibility lies with the user of the vehicle, and he should at once have the tire taken off and re-set; if the tire is loose, it should be put back on the wheel, tight, and if it is too tight, so that there is too much dish in the wheel, it should be expanded and put back, giving the wheel only the proper dish.

Hand-Forging as an Art

J. M. WILLIAMS

James A. Baughman of Charlotte, Michigan, a blacksmith since 1856, is an artist at his trade, as witnessed by his unique collection of hand-forged articles which has attracted wide attention in this section. Not an article in the collection shown in the photograph has seen a machine. A hammer, a file and emery paper were used to finish the work which is all made of what is known as "light steel." Mr. Baughman started this art work when he was 73 years old, and his skill has attracted much favorable comment from the traveling



men who have occasion to visit his shop on business. The "Old Town Pump" and the water pitcher shown in the collection were especially hard to fashion, and few people will believe that Mr. Baughman did this work all by hand. Mr. Baughman was compelled to manufacture bolts, screws, nuts and other articles by hand when he was learning his trade, as those articles were not manufactured on the scale they are today. He consequently attained a high degree of proficiency. Hand forging has become a hobby with him now, and many pleasant hours are spent by the friends of "Uncle Jim," watching his skillful fingers fashion intricate designs.

Forging Machines and Bulldozers

JOHN CARRUTHERS

We have but one forging machine in our shop, and have to use it for both light and heavy work, and I think it is a good idea when there is but one machine in a shop to get a large one, because you can do light work on it, but you cannot do heavy work on a small machine. For instance: we make $\frac{5}{8}$ -inch grab irons on a 3-inch machine, one heat for each end. These are all ready to go into the car in two heats, upset, punched and bent. We also make brake hangers with solid and bent eyes.

We started to rebuild a lot of cabooses and wanted a lot of pieces bent in various shapes and, as I had no bulldozer, had to make one. I got a cylinder, 19 by 24 inches, some rail, and made a machine which does the work very well. We can bend 6 by $1\frac{1}{2}$ inch, and we bend drawbar pockets with it, so you can see that the man without a forging machine and power bulldozer can get along, with a little push; however, we can make too many tools. I mean by that that we can make tools for work that will not pay for the making, because there is not work enough for them; therefore, I think, before making a tool we should stop and ask, "Will it pay?" It will not pay to make a tool for your machine to make about twelve articles once in six months, because, when you figure out the time it takes to make the tool and set it up in the machine, you will find it cheaper to make the articles by hand.

About material for dies and punches: This depends a good deal on what kind of forgings you are going to make, as we have them made of cast iron, carbon steel, axle steel, tire steel and some cast iron with steel faces, as for punches. We make most of them of air-hardening steel, which we find is the best for punches, as we have them from $\frac{3}{8}$ to $1\frac{1}{8}$ inch round. We punch all of our brake hanger pins and brake rod pins with a round punch, which I find is cheaper than drilling them, and I think that is what the machines and tools are for,—to get work out as cheaply as possible.

Some Hand-Forged Work

BERT HILLYER

The accompanying engravings show a cup that I forged for a friend. The spray of roses is also hand-forged and was placed in the cup when the photograph was taken. The rose was forged from one solid piece. The cup was forged from a flat piece of $\frac{1}{8}$ inch sheet iron. This was driven through three different sizes of round rings, beginning with the largest and finishing up with the smallest size. This left it the shape of a small piece of pipe with a round bottom. A large size bob punch was used in driving the plate through the rings. In going through this operation the thickness of the metal was reduced to $\frac{1}{16}$ of an inch in some places, but in no case was it broken through, care being taken to cool the bottom and leave the rim at a good heat when being forced through the last two rings. The cup was then necked in with two swedge-like fullers, and then filled with melted babbitt. After this had cooled, the metal was driven in around the Masonic emblem, which left the emblem raised. The other marks were cut in with a small cold chisel. The cup was then heated and the babbitt poured out.

The handles were made to represent sea horses. These pieces were made from $\frac{5}{8}$ -inch round iron drawn down tapering, with small lumps left on which were afterwards flattened down to make the fins. After having been shaped to fit the cup, a small ladle of babbitt was melted and the handle of cup placed in it. The iron, being the lightest, floated on top, thus leaving half of the handle on the surface. When the babbitt got cold it held the handle

firmly; this prevented the burning of the opposite side when heating and hammering on top. When one side was finished, the babbitt was melted and the handle turned over and finished up in the same way. The handle can then be welded on with gas, or brazed or riveted.

If the readers of THE AMERICAN BLACKSMITH have the December number, 1909, they will find an article by the writer with sketches showing how to forge a cup or vase with handles from one piece.

The other engraving is of a fire set which I recently finished. The picture is a very poor one and does not bring out the lines and small parts properly. However, there are many raised parts that look just plain in the picture. The handles have raised lines and leaves on them which, of course, show plainly on the original shovel, poker and tongs. The pan part has a raised beading



A RECENT PIECE OF WORK BY
MR. HILLYER

around the edges. An example of how iron looks when tied in knots for ornamental purposes is shown above the pan between the two large leaves. These knots attract the eye and keep the mind busy wondering how knots could be tied with such stiff metal as iron or steel. However, all these things have been explained



repeatedly by the writer in previous numbers of *THE AMERICAN BLACKSMITH*. The engraving shows how they look when assembled.

Thoughts on Timely Topics

BY THORNTON

Caustic Censure and Cheery Comment

YOU CAN'T SOLVE THIS problem of cost and profit accounting by warming the head of a nail keg, winding your legs around its staves and chewing the rag. A good enough sort o' chap came into my place the other day, sat down on the edge of a near-by work-bench, took a new gob of Battle Axe into his grinding attachment and then said he'd like to know how I go about this accounting business.

(Before telling you what I said to him I must explain that I knew he read "Our Journal," because I got him to subscribe. And I know he reads it, because he often twits me about some of the decided views I take in regard to some things.)

So knowing this, I said: "Joe, in the first place I want you to change your brand of chewin'. Buy a box of Spearmint if you must chew—you'll find it easier on your shirt front. And then, after you've done that, take your copy of *THE AMERICAN BLACKSMITH* and just do as it tells you. Don't read all about the nice prices you can get—about the profit you should make, and expect somebody to come along with a magic flute to draw the money out of your books and into your money drawer. No good will ever come of just reading. A parrot may be a humdinger as a talker, but it's no good as a thinker. And some folks may be great on reading, but that doesn't necessarily indicate that they are especially long on real knowledge. It reminds me somewhat of the sermons John L. Sullivan used to preach on the demon, rum, and what John didn't say about intoxicants wasn't worth mentioning. At the same time John could punish more rotgut than any man his size. Still he maintains that the greatest battle he ever fought was with Old John Barleycorn.

And, so, reading about costs, profits and accounting will never do you any good in this world or the next unless you act—unless you use the pointers you get."

WONDER WHAT WOULD HAPPEN if some of the writers who are paid by the auto and truck makers would tell the truth. I have recently read some stuff (that's just what it is—matter written for the purpose of stuffing those people who haven't got enough brains to do their own thinking) calculated to tell just what's what about the horse and truck. Now right here I want to say that I am for progress. I'm strong for economy. But I am strong against lying. And I think pretty blank strong, too, that the sooner the auto truck people stop exaggerating, lying and coloring the truth about the horse and the auto, the sooner will they come into their own. I'm a firm believer in letting machinery do all it can, whether it is the work of human beings or animals. If the auto truck can do its work better than horses, I say by all means get the truck and let it do it. *But*—the auto isn't as economical as a horse in all of the ways that the truck maker would have you believe.

Now for some brass tacks: In a book issued by one truck maker, a comparison is drawn between the cost of operating a one-horse wagon and a one-ton truck. Some of the inconsistencies in the case of the horse vehicle are the rental value of the horse and the wagon, the rental value of feed space and harness space, the cost of manure removal. There are no corresponding charges in the case of the truck, though why a truck wouldn't have rental value is beyond

my think trap. Even with these glaring inconsistencies the per day cost of the horse is less than the truck, though the tables make it appear that the mileage cost is less in the case of the truck. Of course, the truck manufacturer doesn't take into consideration the fact that the owner of a vehicle will probably want to go only a certain number of miles per day in either case. On the contrary he figures a maximum mileage in the case of the truck.

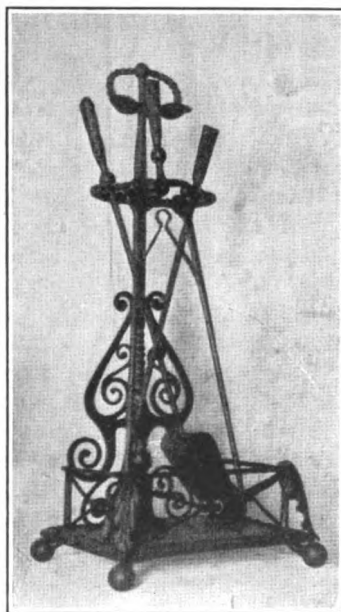
Another neat little piece of literature was written by a very clever chap who seems to get a lot of satisfaction out of the most incongruous comparisons. For example, he points out the fact that the steel corporation handles its twenty-five million tons from ore-bed to finished product without the aid of horses. Of course they do it without the aid of motor trucks, too, but this very good writer doesn't say so.

This writer also tells us that a horse requires twenty-seven minutes of attention per day or a total of twenty eight-hour days per year. Of course, nothing is said about the time and attention a truck requires. Not one word about the several times twenty-seven minutes that every auto driver remembers, but tries to forget, during which the blankety-blank thing wouldn't go. And when finally he had to call upon a humble "hay-motor" to pull him home.

Another comparison made by this good writer was the fare cost in a horse-cab and in a street-car. He says the cost of a horse, cab and all, is not over \$1,000 while the average fare is \$1.50; yet in a street car costing \$10,000 the fare is five cents. Yes, and in a taxicab costing anywhere from \$3,000 to \$6,000 the fare is almost anything in and out of reason—a charge of two and three dollars being a mere snap of the fingers.

And, finally, let me point out this very illuminating sentence: "A cablegram can be sent around the world while a horse-plow is moving two hundred yards." Great rings of compression! think of it—A cablegram all the way around the world while a horse pulls a plow two hundred yards. Wonderful argument against the horse—better let the cablegram pull the plow, eh?

The article is just heaping full of similar bunk and it's calculated to



A FIRE-SET VERY ARTISTICALLY FORGED

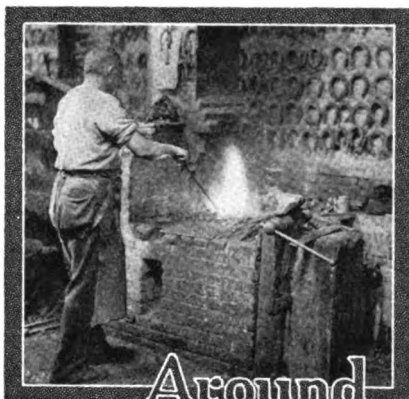


sell auto trucks and tractors. Wouldn't it be better—far, far better, brother—to tell the truth? To can the bunk, and let both the horse and the trucks stand on their respective merits?

And while we're on this subject, just let me refer to that article by Prof. Gay which appeared in the March issue, page 139. There's a man after my own heart. No mistaken ideas—no prejudice against the motor because he has most to do with horses. Just a plain, straightforward, honest discussion of the subject. Seems to me it would be best for everyone if the auto-folks would reciprocate in kind.

"IS THE FOOT-AND-MOUTH DISEASE one attacking cattle only?" asks a querist, evidently mistaking this department for a consulting veterinarian's office. This is a little out of our line, but we are always willing to give any information we can that will be of help to any of our readers, and it is just possible that a bit of comment on this subject will help some of us. No, the foot-and-mouth disease is not a disease peculiar to cattle alone. It often attacks human beings. And when it does the patient kicks with his mouth and thinks with his feet. We have seen both men and women afflicted with the disease in its most virulent form, and from our observations we should judge that the victim of the attack is quite helpless when the disease has once taken hold.

WHEN IT COMES TO HIRED HELP there isn't any thing, person or animal, that we've seen yet, got it on a real good wheel-spinner of a gas engine. It's the equal of any brand of hired help, and then some. It'll snore louder than anything this side of the red pit, when it loses its muzzle, and on a real snappy winter's morning it's got any hired man with the over-sleeping habit beaten a mile, for cussedness. But—when it gets started—gosh-all-gee-whiz, it certainly do work! Of course you have got to know how to handle one and how to coax and cuddle it, the same as you do with every other kind of help. But when you've worked your way into its affections it will do more work on one quart of gasoline than three men will do, even when coaxed into activity by several growlerfuls of suds.



Around Our Forge Fire

Collecting from Dead Beats Without the Aid of a Lien Law

"Say, Mr. Editor!" called Benton from the window side of a newspaper. "what's all this talk about lien laws? Understand some States have passed lien laws—is that so?"

"Yes, there are several States with lien laws at the present time," returned the Editor. "But there are a good many of the States that need them. New York State needs a lien law badly."

"Well, can a smith not collect for his work without a lien law?" questioned the recipe man. "How can a smith get his money without going to a great deal of legal trouble, and then stand a chance of losing the fight for the money that really belongs to him, in court?"

"One way of beating the dead beat at his own game is to undo the work you have done," returned the Editor. "In other words—if a man comes into the shop to have his horse shod and then wants the shoer to charge it, the shoer can insist upon cash or, if that is not forthcoming, remove the shoes from the animal's feet."

"Or he might do as one of our good friends down Batavia way did. Mr. Dietchler from down there was in the other day and was telling me of a case he had. A man came into town with a horse and buggy. He brought the horse in to be shod. He had already purchased a quantity of groceries and other things, and among the other things was a near-jag. When Friend Dietchler asked for his money for shoeing the horse, the man refused to pay cash. So the shoer refused to let him have the animal. 'If you've got money for liquor you've got money to pay for your horseshoeing'—is the way Dietchler put it."

"When he closed the shop, Dietchler pulled the buggy inside, but took the horse to his barn adjoining his home. Here he placed him in a stall and fed him. That evening the man, with the sheriff and another man in tow, came after his horse. But they didn't get it."

"Better give the man his horse" said the sheriff. But Dietchler firmly refused to deliver the horse until the shoeing was paid for.

"And Dietchler says he kept that horse from Saturday until Monday before he received his pay and delivered him to his customer. It seems to me a bit more of that spirit among the craft, and little if any difficulty would be experienced in getting cash when you demand it."

"Another case I heard of a while back was on a wagon job. A notoriously unreliable farmer drove up to a shop and told the smith to put in a number of new spokes,

patch the box bottom and renew several spring leaves in a wagon which he left at the door. The smith knowing the man with whom he was dealing said—"You know, I'm doing work for cash only, Mr. Brown. Bring the cash with you when you come for your wagon."

"The customer was inclined to hedge at this proposition, but finding the smith unwilling to do the work except on a cash basis, the farmer finally agreed to bring the money. So the smith did the work and, upon its completion, phoned his customer to call for his wagon. This the farmer did after a day or two. When he came, the wagon was in the shop, pulled to one side. The customer walked in, looked over the work carefully while the smith was busy and proceeded to pull the wagon out where he could hitch his team to it. The smith dropped his work and walking toward him asked the man if the work was all right. 'Yes,' said the customer, 'I guess it's all right.' 'I'm glad to hear it,' said the smith. 'My charge is nine-fifty.'

"To this the customer paid no attention, but continued pulling his wagon toward the door. When nearly to the big doorway, the smith said; 'That job is nine-fifty, Mr. Brown—you know my terms are cash.' 'I'll come in with it tomorrow when I'm coming down to the store' replied the customer, about to pull the vehicle out the door.

"At this the smith gently but firmly grabbed the centerpole of the wagon and proceeded to back the vehicle into the shop. This the customer was inclined to resent, but a more or less gentle grasp on the shoulder and a push to one side showed the man that the smith meant business.

"When the smith replaced the wagon in the back of the shop, he said: 'Now, Mr. Brown, if you want your wagon you pay for the work first.' The man was not inclined that way, however, and insisted upon getting his property, as he called it. 'All right,' agreed the smith, 'you'll get your property and right away, too.' The smith then ordered his men to rip out all the new work that they had put into the rig and to put back the old as well as they could. Upon these instructions the men were beginning to act when the customer yelled about damaging his wagon. He also said that he'd pay immediately. 'I ought to get some things in town with this money, but I suppose I got to buy your off or you'll make my wagon worthless.'

"You're not buying me off," said the smith, refusing the money and motioning his men to continue at work. 'You agreed to pay cash, and cash you will pay for the work.' The customer was now well scared and said: 'All right, all right, here's your money for the job. Give me my wagon and I'll go.' The smith now took the money and called to his men to replace what they had taken from the wagon. This did not amount to much as they had been well coached to just such tactics and had really made more noise than the work of tearing out warranted.

"Now, there are two ways in which some smiths deal with notoriously dead beats. And while a smith is taking things pretty much into his own hands, a bluff of that kind will usually work. Of course, a customer treated in that way is not inclined to come back, but no good smith wants such a customer."

"Well, that's pretty strenuous business" agreed Benton. "But extreme methods are necessary in dealing with the people who make a business of getting their goods of this world for nothing."



"A Purely Australian Buggy"

The following smart satire on the evidence of a witness before the Tariff Commission appeared in a recent issue of the *Sunday Times*.

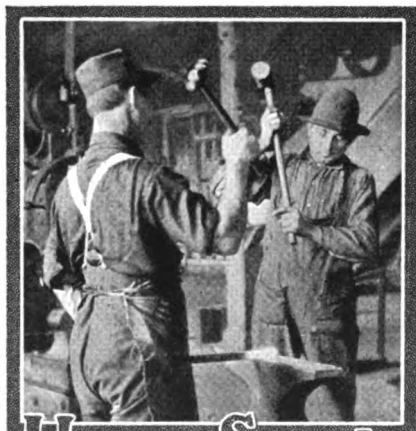
A buggy-builder giving evidence before the Tariff Commission, in Melbourne on Friday, said that Australian buggies were the best; but he urged that all carriage parts should be admitted free. Axles, bolts, etc., should be on the free list!—*News Item*.

"I admit, if particulars are to be sought,
That the hickory shafts of the buggy were
brought
From America here; but it's not to be
thought
That it's not an Australian buggy!"

"I admit that the wheels, which are pat-
ented here,
Are American-made; but does that inter-
fere
With the fact that my statements are
plain and sincere?
It's a purely Australian buggy!"

"I admit that the nuts and the bolts and
the screws
And the springs and the axles and the
tyres we use
Are imported; but still I must sternly
refuse
To admit I imported the buggy!"

"That the lamps are imported is true;
and the hood;
And the bulk of the ironwork; all of the
wood;
And the colours for painting; but still
it's a good
And a purely Australian buggy!"



Heats, Sparks, Welds

Good idea to sell service with your services, too.

A light heart aids in making a heavy pocketbook.

Ever notice that the lazy man usually has the busiest tongue?

Service? Why, it's the magnet that draws the trade into the shop.

The horn makes the most noise, but it doesn't help make the auto go.

No, prospects are not likely to injure a man's eyesight, no matter how *bright* they are.

It's not what your competitor says, so much as what you do about what he says, that hurts you.

The only kick we make about the flowers at a funeral is that they're about three days late in coming.

Most smiths know that their business methods need a change, but haven't the nerve to go ahead with the change.

The signs of the times indicate that smiths are progressing. How's that sign of yours—does it show progression?

That side line. Have you read the article, "The Blacksmith-Gas Engine Dealer" in this number? Read it—digest it—then act.

"Worry," says someone, "is the father of insomnia. It is the traitor in our camp that dampens our powder and weakens our aim."

It is not so much whether a hen "sits" or "sets," but whether she has "laid" or "lied," when she cackles, that concerns us most.

According to Secretary of State May, the United States with its 1,127,940 automobiles in use has more than all other countries combined.

Everyone needs work done in the spring. Bring them to your shop by advertising. There's lots of ways of doing it, too. Think them over.

It's the customers you keep that count, and not the ones you get. A little more attention to the keeping will make the getting easier.

Your apprentice. Do you teach him by correction or fault-finding? Remember, you had to learn the trade once; give him a hand, occasionally.

Some people are like low-grade ore—they have "gold" in them, but it is so far in that the cost of getting it out makes the profit too small.

The fire is the blacksmith's breadwinner. Every smith should know whether he is using the right coal. Don't fire epithets at the iron when the coal is faulty.

Appearances are sometimes deceiving. You may do good work in a dirty and dilapidated shop, but what customer wouldn't have more confidence in a clean, up-to-date building?

Tom Tardy reports business so good that he "don't git time fer t' do any fishin' a-tall, these days." How about fishing for business, Tom? Room for some of that kind, isn't there?

A good laugh is the best medicine in the world—and easiest to take. Worrying and toiling over one's work does not get it done more quickly nor better. Take, and give, cheerfully.

A cast-iron countenance may be of value in the next world, but it certainly is a disadvantage in this one. Smile a bit, and see the profits grow like flowers beneath the smile of the sun.

Craft is the knowledge that is necessary in the making of creditable work. We want your knowledge—you get others—a mutual uplifting exchange. And the craft is just so much more advanced.

If it were possible to operate upon some shops and cut out the unprofitable, the unnecessary and the absolutely non-essential jobs, there would be little left, and that little would have little life.

"In the dark" on some subjects? Give the interior of the shop a coat of whitewash, clean the windows, put in some lights. Then read THE AMERICAN BLACKSMITH, carefully—you'll soon be in the light.

There's many a slip—that gets mislaid. The Bowden Smithshop System will eliminate this—a nice, large, double-arch file takes care of the slips, and the index system won't allow any slips on the bills.

Never stay dry when thirsty for knowledge. We have a selected list of practical books that are an aid and inspiration to the most experienced; a veritable gold-mine

for the apprentice, and covering a multitude of subjects.

"Our Trusting Department is the roof. Take the elevator." This sign was the first thing that forcibly struck one's eye upon entering a certain shop. It was needless for a customer to ask for credit here, and yet he felt good while loosening up.

A most important item, yet not charged up in the cost of doing business, is courtesy. Some business men hand it out as though it would increase the "o. h." Yet "overhead" is most likely to decrease when a liberal quantity of courtesy is mixed with each batch of business.

Fine feathers may not make fine birds, but they certainly help a lot; and the appearance of a smith-shop may not improve the quality of the work, but it goes a long way toward impressing your customers. Just glance around your shop and imagine you are a customer.

Your billheads, letterheads and other printed matter represent you. Let THE AMERICAN BLACKSMITH make them neat and well-printed. Those who do business with you from a distance know you by your stationery. Your customers will be pleased when they get their bills. Ask Subscribers' Service.

Internal rusting, it is said, affects all machinery that is laid aside after being used. Every enclosed air space, it seems, breathes—drawing in air when a fall of temperature contracts the walls and expelling it when the walls expand with heat. The moisture carried in with the air is deposited in the cavities, and may produce serious damage through rusting.

Metals have diseases, says science and, still more remarkable, one called the "tin pest" is capable of spreading by contagion. Sometimes a block, plate or medal of tin attacked by the disease crumbles and falls into dust, and sometimes warty protuberances appear on the surface of the metal. These diseases are not due, as has been supposed, simply to moisture. Temperature plays a part in producing them.

Experiments to demonstrate the capacity of steel to endure greater pressure than the hardest stone were recently carried out in Germany. Corundum was chosen for the stone, and small cubes of both the corundum and steel were placed under pressure. A weight of six tons smashed the corundum, but forty-two tons were required to crush the steel. When the steel did give way, the metal flew into powder, with a loud explosion, and its sparks are said to have bored tiny holes in the crushing machine.

Walls of cinder concrete constructed five years ago at Columbia University have at various times been subjected to fire tests. They were heated for hours to 1700° Fahrenheit and, while hot, a stream of water was applied. Notwithstanding these severe tests, the walls for all practical purposes are as serviceable as when erected. The pieces of coal that happened near the surface of the walls were burned to ash, but the ash remained in place. Several particles of pure coal were found within two inches of the surface at the conclusion of the tests.

The breaking strength of rings in a series of experiments and after most elaborate calculations is found to be a little less than twice that of a rod of the same cross section. For example, a 3-inch ring, made of ¾-inch iron, broke at 19½ tons; a 4-inch ring at 19.9 tons; and a 6-inch ring at 20 tons; while the strength of a bar of the same metal was 10½ tons. It also appeared in these tests that a ring of ductile metal like malleable iron will be pulled out into the form of a long link before it breaks; so the ultimate strength of the ring is virtually independent of its diameter.



Our Honor Roll

The Only Paper

There are a few other publications beside "Our Journal" that have a paid-in-advance subscription list, but we know of no other publication on earth that can boast of a list such as ours. As far as we know and can learn The Fix-It Shop of Utah is the Champion of Long-Time-Subscribers, with Mr. W. C. Watt of Kansas as winner of second place. Then there are Waddington Farm of West Virginia and Mr. I. J. Stites of New Jersey close up in third and fourth position.

And after that comes the big, roomy, easy-to-get-into class of 1924. Just send your order and remittance for ten years and see how easily your name will fit into that 1924 division. There is an especially roomy place there for some subscriber in some country other than United States. The leaders in other countries are Breen & Son of Ireland. How about an Australian representative in the 1924 class?

U. S. and Mexico		Canada		Other Countries	
2 yrs.	\$1.60 save \$.40	2.00 save \$.50	10 sh. save 2 sh.		
3 yrs.	2.00 save 1.00	2.70 save 1.05	14 sh. save 4 sh.		
4 yrs.	2.50 save 1.50	3.20 save 1.80	18 sh. save 6 sh.		
5 yrs.	3.00 save 2.00	3.75 save 2.50	1 £ save 10 sh.		
10 yrs.	5.00 save 5.00	7.00 save 5.50	1 £ 14 sh. save 1 £ 6 sh.		

Send your order and remittance now—today. Don't wait until you forget all about it. You'll never regret it. Our subscription insurance saves you money. The sooner you begin saving the more you save. There is no time better than NOW.

NAME	Subscription Paid to	NAME	Subscription Paid to
THE FIX-IT SHOP, Utah	July, 1935	E. ANDERS & SON, S. Aus.	May, 1922
W. C. WATT, Kan.	Dec., 1930	LOUISA CARRIAGE WKS., Va.	May, 1923
WADDINGTON FARM, W. Va.	Mar., 1928	S. SMITH, Tex.	Apr., 1922
I. J. STITES, N. J.	Jan., 1928	J. W. HAAR, La.	Mar., 1922
J. H. DAVIS, Cal.	Dec., 1924	E. A. DILLON, Nev.	Mar., 1922
A. BOSCH, N. Y.	Mar., 1924	D. W. SMITH, R. I.	Mar., 1922
A. R. JOHNSON, R. I.	Feb., 1924	D. F. KUSTER, Wash.	Mar., 1922
F. JACOBS, Ohio	Feb., 1924	G. F. JOHNSON, Mich.	Feb., 1922
E. FOWLER, Pa.	Jan., 1924	R. H. KEITH, Iowa	Jan., 1922
BREEN & SON, Ireland	Dec., 1923	O. M. JOHNSON, Minn.	Oct., 1921
M. LAMORRAUX, Ohio	Dec., 1923	H. FELDUS, Neb.	Sept., 1921
C. R. DAVIS, N. Y.	Dec., 1923	W. K. KLING, Kan.	May, 1921
F. W. COPELAND, Me.	Dec., 1923	F. NORRIS, Yukon Ty.	Jan., 1921
J. L. TOMLIN, Kans.	Dec., 1923	J. L. JESTER, Mo.	Jan., 1921
H. A. DAVIS, N. Y.	Dec., 1923	T. P. CONSIDINE, Mass.	Dec., 1920
E. H. TROTTER, Ill.	Dec., 1923	Ed. GRIMM, Tex.	Mar., 1920
J. BAILEY, Man.	Dec., 1923	R. S. CRISLER, Ky.	Jan., 1920
F. WATKINS, N. H.	Nov., 1923	P. REIF, Ohio	Dec., 1919
J. KOPFKE, Ala.	Nov., 1923	P. GUDMUNDSON, S. Dakota	Nov., 1919
W. C. LINDBERT, S. Aus.	Oct., 1923	R. RAMAGE, N. W. Ter.	Nov., 1919
W. B. ABELL, N. Y.	Oct., 1923	J. NAMMITT, N. Zealand	Nov., 1919
W. R. TURNER, Man.	Oct., 1923	F. UNDERWOOD, S. Africa	Aug., 1919
C. NELSON, Neb.	Sept., 1923	R. RASS, Sask.	June, 1919
O. W. TAYLOR, Pa.	Aug., 1923	THEO. PASCHKE, Neb.	Apr., 1919
CRAMP BROS., Tas.	Aug., 1923	I. M. TOWNSEND, Cal.	Apr., 1919
L. C. LARSEN, Iowa	July, 1923	G. BIRN, Fiji Islands	Apr., 1919
S. EFFENHAAR, S. Africa	July, 1923	C. WILLIAMS, W. Aus.	Mar., 1919
G. L. DEWITT, Mont.	July, 1923	R. TAYLOR, N. Zealand	Feb., 1919
W. W. GREGG, Tex.	July, 1923	R. STRODE, Ore.	Feb., 1919
O. C. YOUNG, Mich.	June, 1923	J. J. BEGERHOLM, Cal.	Jan., 1919
OTTO SIFFEL, Penn.	June, 1923	L. A. TIERING, Kans.	Jan., 1919
A. CHAPMAN, N. Y.	June, 1923	W. S. WAGNER, Tex.	Jan., 1919
C. BIRLEY, Md.	June, 1923	J. R. CONARD, Kan.	Dec., 1918
F. H. SHUFF, Penn.	June, 1923	A. O. GIBOUX, Mass.	Dec., 1918
J. C. STOVER, Penn.	Apr., 1923	A. A. MURRAY, Tex.	Dec., 1918
W. SCHOONOVER, Penn.	Apr., 1923	C. W. BRAKE, Mich.	Dec., 1918
J. B. RUNNIE, Iowa	Mar., 1923	J. DUBENDORF, Penn.	Dec., 1918
LOWMEAD BROS., Mo.	Mar., 1923	G. F. LAUGHLIN, Ill.	Dec., 1918
J. CARSWELL, Ark.	Mar., 1923	L. M. PIATT, Penn.	Dec., 1918
G. E. GLASSER, Ohio	Mar., 1923	F. BOECKMAN, Ill.	Dec., 1918
T. BRADLEY, N. S. Wales	Mar., 1923	W. H. HABERMEHL, Iowa	Dec., 1918
G. FATH & CO., S. Africa	Mar., 1923	E. T. MARSHALL, Wis.	Dec., 1918
I. T. NEEDHAM, Ill.	Feb., 1923	F. HOOPENGARDNER, Md.	Dec., 1918
G. C. DRINGER, Miss.	Feb., 1923	HEBREW TECH. Inst., N. Y.	Dec., 1918
J. HUGHES, Ohio	Feb., 1923	G. E. WINCHESTER, Cal.	Dec., 1918
J. WISNER, Minn.	Jan., 1923	F. T. GRISHAM, Ark.	Dec., 1918
Z. A. ENOS, Kan.	Jan., 1923	R. E. RUSSELL & SON, Penn.	Nov., 1918
W. G. WISE, Cal.	Jan., 1923	H. SCHAFER, S. Dakota	Nov., 1918
F. S. BISHOP, S. Africa	Jan., 1923	D. MACDONALD, N. S. W.	Nov., 1918
S. P. HARNET, Mont.	Dec., 1922	C. A. RITCHIE, Scot.	Nov., 1918
W. BRECKNER, Okla.	Dec., 1922	T. E. SANDERS, Eng.	Nov., 1918
J. PABIAN, Neb.	Dec., 1922	G. E. HARDCASTLE, N. Y.	Nov., 1918
P. FREDERICKSON, Iowa	Nov., 1922	V. VALLANCE, N. Y.	Nov., 1918
L. O. LEITURA, Ill.	Nov., 1922	C. ZIEHR, Iowa	Nov., 1918
W. LAWSON, N. Z.	Nov., 1922	CYCLONE GATE & FENCE Co., S. Africa	Oct., 1918
W. H. MILLER, Iowa	Oct., 1922	W. ALSON, Minn.	Oct., 1918
A. O. MARTIN, Idaho	Sept., 1922	H. P. BOWERMAN, N. D.	Oct., 1918
O. A. MORTIMER, Idaho	Sept., 1922	J. DELANE, Neb.	Oct., 1918
H. J. WYATT, Wash.	Sept., 1922	P. DEVERNET, Viet.	Oct., 1918
J. N. SKOW, Iowa	Sept., 1922	H. C. HENDERSON, Queens.	Oct., 1918
A. D. STANDFORD, Wash.	Sept., 1922	J. ELEY & SONS, S. Aus.	Oct., 1918
T. TINKLEWEIR, Que.	Sept., 1922	J. E. MATTHEWS, Eng.	Oct., 1918
A. PREIFFER, Ohio	Aug., 1922	MUNRO & CO., N. Z.	Oct., 1918
W. D. VALENTINE, Iowa	Aug., 1922	D. R. WINTON, N. S. W.	Oct., 1918
G. HOFFMAN, N. Y.	July, 1922	E. SCHRAFFEL, S. Aus.	Oct., 1918
J. ENMAN, Ark.	July, 1922	J. WILKINSON, Queens.	Sept., 1918
W. K. W. HANSEN, Pa.	June, 1922	GRIMLEY, Ltd., N. S. W.	Sept., 1918
ROBERT TOSTER, Cal.	June, 1922	C. E. BIRLEY, Md.	Sept., 1918
J. VAN MARTER, N. Y.	June, 1922		

NAME	Subscription Paid to	NAME	Subscription Paid to
J. F. BAGGETT, Queens	Sept., 1918	KATE & AINLEY, Eng.	Nov., 1917
J. THORNTONCROFT, N. W. Ter.	Sept., 1918	T. H. ZIEGLER, Wis.	Nov., 1917
W. A. THUGH, Queens	Sept., 1918	SCHOLLER BROS., Ind.	Nov., 1917
A. L. VARRIS, S. Africa	Sept., 1918	E. M. WURSTER, Mich.	Nov., 1917
GEO. A. PETTY, Utah	Sept., 1918	S. Z. FREY, Ind.	Nov., 1917
G. W. HAZLETT, Pa.	Sept., 1918	B. A. STEINKE, Ohio	Nov., 1917
C. WALTER, Ore.	Sept., 1918	J. N. BATHGATE, N. Dak.	Nov., 1917
T. B. HOLZ, Okla.	Sept., 1918	W. H. HOUGHTON, Pa.	Nov., 1917
ROBERT COOK, Ky.	Sept., 1918	G. W. BOOZE, La.	Oct., 1917
A. B. WENDLANDT, Wash.	Sept., 1918	C. R. WALTERS, Ill.	Oct., 1917
A. J. BROOKMAN & Co., Vic.	Sept., 1918	S. SMITH, S. Aus.	Oct., 1917
PETER COCKS, W. Aus.	Sept., 1918	W. STEPHEN, Queens.	Oct., 1917
R. J. TOMPKINS, Texas	Sept., 1918	W. T. CUTKOMP, Iowa	Oct., 1917
J. VASCHETTI, Colo.	Aug., 1918	GEO. POTSCHEK, Mo.	Oct., 1917
E. C. PUTTON, So. Aus.	Aug., 1918	J. W. RAPS, N. Y.	Oct., 1917
V. D. SIBLEY, B. C.	Aug., 1918	W. C. RONEY, Pa.	Oct., 1917
L. SMITH, Cal.	Aug., 1918	J. N. MILES, Ky.	Oct., 1917
W. CRIBB, Queensland	Aug., 1918	C. L. THOMPSON & SON, N. D.	Oct., 1917
GEO. REID, S. Africa	Aug., 1918	EMIL PLATE, N. D.	Sept., 1917
H. KLEINBERG, N. J.	Aug., 1918	F. STAUB, Ohio	Sept., 1917
W. D. BRADFORD, Cal.	Aug., 1918	B. T. LARSON, Minn.	Sept., 1917
A. DISCHER, Aus.	Aug., 1918	H. SCHOONOVER, N. Y.	Sept., 1917
T. H. GRAHAM, Vict.	July, 1918	PERFECTION SPRING CO., O.	Sept., 1917
GILBERT BROS., S. Aus.	July, 1918	W. A. WILSON, N. Z.	Sept., 1917
A. MACKENZIE, W. Aus.	July, 1918	R. ROSS, N. S. Wales	Sept., 1917
GEO. DASH, N. Zealand	July, 1918	I. E. SPROUD, Me.	Sept., 1917
C. R. OLIVER, S. Africa	July, 1918	FRED. BLOHM, Tex.	Sept., 1917
L. G. REID, S. Africa	July, 1918	R. E. MATTOX, Va.	Aug., 1917
W. M. PURYEAR, Ala.	June, 1918	C. T. WOOD, Kans.	Aug., 1917
THOM & VESTER, S. Africa	June, 1918	GEO. B. HEATON, N. J.	Aug., 1917
L. LACASTE, Que.	June, 1918	CLARK & FAURET, Queens	Aug., 1917
WRIGHT & SON, Texas	June, 1918	C. L. HOCKETT, Cal.	Aug., 1917
ALBERT MELLUM, N. D.	June, 1918	H. C. STENZEL, Tex.	Aug., 1917
J. LINDSAY, S. Africa	June, 1918	M. DEJAGER, S. Africa	Aug., 1917
J. H. GIBBS, S. Africa	June, 1918	F. HOWARD, Kan.	Aug., 1917
W. W. BRIDGES, Ark.	June, 1918	H. FERREL, Ill.	Aug., 1917
MATHEWSON BROS., Iowa	May, 1918	J. MCMEIKEN, N. Z.	Aug., 1917
ED. HOLLAND, Queens	May, 1918	F. H. GIERKE, S. Aus.	Aug., 1917
H. L. HASWELL, N. C.	May, 1918	A. L. PITTANGER, Ill.	Aug., 1917
CHRISTENSEN BROS., Cal.	May, 1918	F. SPINKA, England	July, 1917
G. F. BRACKETT, Wash.	Apr., 1918	J. P. KELLY, Md.	July, 1917
E. KOEFKE, Wis.	Apr., 1918	F. G. STONE, S. Africa	July, 1917
J. H. MARTIN MFG. CO., Ind.	Apr., 1918	H. J. DEVONSHIRE, N. Z.	July, 1917
H. S. WAYNE, S. Aus.	Apr., 1918	V. J. HUBBARD, N. Y.	July, 1917
H. S. YONGUE, Wash.	Apr., 1918	J. C. SKINNER, Vict.	July, 1917
W. WELHAUSEN, N. D.	Apr., 1918	A. FARMACHT, Tenn.	June, 1917
W. H. CHIPMAN, Mo.	Apr., 1918	H. A. CHEEVER, N. H.	June, 1917
A. P. STROBEL, N. Y.	Apr., 1918	D. SHAFFER, N. Y.	June, 1917
E. H. ALBRECHT, Pa.	Apr., 1918	W. R. GELLING, S. Africa	June, 1917
J. R. JEFFRIES, Pa.	Apr., 1918	J. H. BAKKER, S. Africa	June, 1917
R. COLVIN, Ind.	Apr., 1918	A. R. HALLENBECK, N. Y.	June, 1917
J. LIPPERT, Ill.	Apr., 1918	F. C. BOCK, Neb.	June, 1917
OTTO TIEFT, S. Africa	Apr., 1918	W. PRATT, Iowa	June, 1917
FLA. AG. & MACH. CO.	Mar., 1918	J. H. STINER, Ohio	May, 1917
J. V. FISH, Ill.	Mar., 1918	C. A. STEBBINS, Kan.	May, 1917
H. J. FISHER, Mich.	Mar., 1918	W. S. SULLIVAN, La.	May, 1917
GEO. SMITH, N. Z.	Mar., 1918	H. SMITH, Queensland	May, 1917
AUG. HOLMAGEL, Ore.	Mar., 1918	P. VANDERBACH, Mich.	May, 1917
A. E. UENLING, Wis.	Mar., 1918	YOST & HALVORSON, Minn.	May, 1917
J. C. YOUNG, Pa.	Mar., 1918	W. MCCOY, Kan.	May, 1917
D. C. HOUCK, Ohio	Mar., 1918	A. GUSTLER, Tex.	May, 1917
JOHN EYER, Neb.	Mar., 1918	C. F. J. LORENT, N. Y.	May, 1917
A. E. DELANO, Me.	Feb., 1918	A. DATWYLER, Ohio	May, 1917
S. S. STAPLES, Ohio	Feb., 1918	E. T. HOOGMAN, Conn.	Apr., 1917
J. J. BOYD, Idaho	Feb., 1918	O. F. MATSON, Utah	Apr., 1917
J. MOLITOR, Ill.	Feb., 1918	F. PETTIT, Okla.	Apr., 1917
F. P. FELLOWS, N. Y.	Feb., 1918	H. G. MARRIOTT, Utah	Apr., 1917
J. W. STEADMAN, Ohio	Feb., 1918	E. THEBAUDRAU, Wis.	Apr., 1917
J. P. HOLAPPEL, Penn.	Feb., 1918	W. PICKERING, S. Africa	Apr., 1917
R. N. GATES, Vic. Aus.	Feb., 1918	ED. BURROWS, England	Apr., 1917
RENTON WAGON WKS., Wash.	Feb., 1918	L. KAUSCH, Wis.	Apr., 1917
WRITING FDT. EQUIP. CO., Ill.	Feb., 1918	J. M. BROWN, Tex.	Apr., 1917
J. P. KOENIGS, S. Dak.	Feb., 1918	P. PFREIFFER, Ore.	Mar., 1917
RICHARD BRENNER, Tex.	Feb., 1918	W. WATSON, Vic.	Mar., 1917
W. F. HILL, N. C.	Feb., 1918	W. BAGLEY, Mass.	Mar., 1917
O. O. GODFREY, Wis.	Feb., 1918	B. E. CAMPBELL, Mass.	Mar., 1917
M. C. BETTIS, Tex.	Jan., 1918	P. RUFFER, Ill.	Mar., 1917
P. SHIRMIN, Cal.	Jan., 1918	G. STANSKE, Wis.	Mar., 1917
J. B. BETTEL, Me.	Jan., 1918	W. H. MILLER, Mo.	Mar., 1917
W. MISCALE, Queen, Aus.	Jan., 1918	J. C. WOODS, W. Aus.	Mar., 1917
S. PORTANCE, Que.	Jan., 1918	C. BOULTON, N. S. Wales	Mar., 1917
D. C. FOLEY, Cal.	Jan., 1918	C. A. HAWKINS, Ore.	Mar., 1917
GLEASON BROS., La.	Jan., 1918	A. L. MONTGOMERY, W. Va.	Mar., 1917
C. E. KRUG, Wis.	Jan., 1918	J. PETERSON, Ia.	Mar., 1917
G. E. WOODARD, Kan.	Jan., 1918	J. ANDERSON, Tas.	Mar., 1917
P. J. DALLY, W. Aus.	Jan., 1918	A. J. NEILL, Vt.	Mar., 1917
J. MORROW, Pa.	Jan., 1918	ED. DEITRICH, Ind.	Mar., 1917
O. HOGA, N. D.	Dec., 1917	LEWIS CHASE, N. Y.	Mar., 1917
G. W. MILLER, Penn.	Dec., 1917	E. O. LEE, S. Dak.	Mar., 1917
G. M. SHYMOUR, Ill.	Dec., 1917	S. STEMPLE, Ohio	Mar., 1917
J. TEMPLETON, Scotland	Dec., 1917	R. S. GUGISBERG, Kan.	Mar., 1917
F. PROCTER, Tas.	Dec., 1917	J. S. HASKELL, Col.	Mar., 1917
J. G. JOHNSON, Ill.	Dec., 1917	W. L. ROARK, Tex.	Mar., 1917
F. E. EGGLESE, Ohio	Dec., 1917	A. R. BARLOW, Tex.	Mar., 1917
C. T. FORREST, Cal.	Dec., 1917	C. A. WHITACRE, Ohio	Mar., 1917
THEO. BUSH, N. Y.	Dec., 1917	B. P. CARNET, Ill.	Mar., 1917
J. T. ELLIOTT, Ill.	Dec., 1917	C. STOCK, N. Z.	Mar., 1917
J. VOELPEL, Ill.	Dec., 1917	A. CUTCHALL, Pa.	Feb., 1917
W. J. MAIN, Cal.	Dec., 1917	M. A. MCGREGOR, W. Va.	Feb., 1917
J. G. LAURE & SONS, Mo.	Dec., 1917	NELA NELSON, Iowa	Feb., 1917
MESS BROS., Victoria	Dec., 1917	F. MEYERS, Iowa	Feb., 1917
E. BLOOMER, Aus.	Dec., 1917	LEONORA BLK. CO., Kan.	Feb., 1917
H. P. ADAMSON, N. Zealand	Dec., 1917	J. W. ZAVODNIK, Kan.	Feb., 1917
C. E. REYME, N. Y.	Dec., 1917	D. S. O'CONNOR, Ind.	Feb., 1917
J. H. ROBERTS, Mich.	Nov., 1917	C. BACKUS, Ohio	Feb., 1917
G. E. BARTLELL, Wash.	Nov., 1917	V. Z. VANOURK, Wis.	Feb., 1917
F. FROELICH, Tex.	Nov., 1917	O. B. LESLEY, Neb.	Feb., 1917
J. A. SHEPARD, N. Y.	Nov., 1917	F. HUSICK, Cal.	Feb., 1917
MC MILLAN, HEAD & CO. S. Africa	Nov., 1917	J. H. TERRINK, Iowa	Feb., 1917
C. ANDERSEN, Queens	Nov., 1917	J. M. BERRY, Ark.	Feb., 1917
J. KILGOUR, Scotland	Nov., 1917	J. E. FREY, Ohio	Feb., 1917
F. R. TOMLINSON, Kan.	Nov., 1917	J. HOERN, Ky.	Feb., 1917
		T. J. DORSET, Conn.	Feb., 1917
		F. MARSH, Mich.	Feb., 1917
		J. H. WHITE, N. H.	Feb., 1917



Advertising and Your Trade Paper

ELBERT HUBBARD

The widespread interest in the subject of advertising is revealed in the formation of clubs to study the theme from every point of view.

Advertising is information as to who you are, where you are, and what you have to offer in the way of skill, talent or commodity.

To stand still is to retreat.

To hold the old customers you must get out after the new.

The reputation that endures, or the institution that lasts, is the one that is properly advertised.

Life, now, is human service.

To deceive is to call in the Commissioner in Bankruptcy.

Nothing goes but truth.

We know this—because for over two thousand years we have been trying everything else.

Academic education is the act of memorizing things read in books, and things told by college professors who got their education pretty much in the same way.

It is easier to be taught than to attain.

It is easier to accept than to investigate.

It is easier to follow than to lead—usually. Yet we are all heir to peculiar, unique and individual talents, and a few men are not content to follow.

"Truth," says Dr. Charles W. Eliot, "is the new virtue."

"Let the truth be known about your business" idea has inspired the best firms to tell of their products to Trade Paper subscribers.

The only man who should not advertise is the one who has nothing to offer in the way of service, or one who cannot make good.

About the best we can say of the days that are gone, is that they are gone.

A good advertiser is never a philosopher or a theologaster—he is a pragmatist. He seeks the good for himself, for his customers, and for the whole human race.

The science of advertising is the science of psychology.

And psychology is the science of the human heart.

The advertiser works to supply a human want; and often he has to arouse the desire for his goods. He educates the trade or public to what it needs, and what it wants, and shows how and where to get it.

We are living, inventing and changing so fast, and there are so many of us, that he who does not advertise is left.

The fact that one has all the business he can well manage now, is no excuse for not advertising.

All that Shakespeare knew of Classic Greece and Rome, and the heroes of that far-off time, is what he dug out of Plutarch's Lives. And about all that most people now know of Greece and Rome they got from Shakespeare.

Plutarch boomed his Roman friends and matched each favorite with some Greek, written of by Herodotus. Plutarch wrote of the men he liked, some of whom we know put up good mazuma to cover expenses.

Horatius still stands at the bridge, because a poet placed him there.

Paul Revere rides adown the night, giving his warning cry, because Longfellow set the meters in a gallop.

Across the waste of waters the enemy calls upon Paul Jones to surrender, and the voice of Paul Jones echoes back, "We have not yet begun to fight."

And the sound of the fearless voice has given courage to countless thousands to snatch victory from the jaws of defeat.

Commodore Perry, that rash and impulsive youth of twenty-six, never sent that message, "We have met the enemy and they are ours," but a

good reporter did, and the reporter's words live while Perry's died on the empty air.

All literature is advertising.

And all genuine advertisements are literature. The author advertises men, times, places, deeds, events, and things. His appeal is to the universal human soul. If he does not know the heart-throbs of men and women, their hopes, joys, ambitions, tastes, needs, and desires, his work will interest no one but himself and his admiring friends.

Advertising is fast becoming a fine art. Its theme is Human Wants, and where, when and how they may be gratified. And since the subscriber, too, must fill such wants, he profits by absorbing and reflecting these truths in trade paper advertising.

Advertising interests, inspires, educates—sometimes amuses—informs and thereby uplifts and benefits, lubricating existence and helping the old world on its way to the Celestial City of Fine Minds.

And especially does your Trade Paper know the Science of Advertising.

First, your Trade Paper carries no shady or uncertain advertising. Everything that treads the border line of dishonesty is eliminated.

The subscriber to a trade paper is, or should be, as much interested in the ads as in the text. Both inform, uplift and inspire.

Your Trade Paper is in partnership with you—the interests of each are identical. The Trade Paper exists for this one reason—to render a tangible aid to you—the subscriber.

To amuse the subscriber, tell him of the embezzlement in Alaska, the elopement in Florida, or the seduction in California—these things are not enough. The subscriber must get ideas that he can use in his business—and any subscriber who studies the advertisements of this Trade Paper does.

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Stopping the Waste of Waste

G. D. CRAIN, JR.

Most observant men, in or out of the trades, know that there is nothing especially new about the much-talked-of and ostensibly novel theory of efficiency in business and scientific management of workmen



in all lines. Boiled down to its essentials, both of these things mean nothing but the elimination of waste; and the kind of common sense which it has always taken to make a success of anything has always told its possessor that waste is foolish.

A certain kind of waste, of course, is inevitable in almost any kind of work, especially where any quantity of material is used. This is true in blacksmith shops, and the amount of waste has usually varied directly in proportion to the size of the shop. Odds and ends of every material used, from iron and steel to lumber, inevitably accumulate, and the best of management and overseeing has never been able to make every job "come out even," as far as the material used is concerned.

In this day of growing economy in everything, resulting in part from ideas of efficiency and scientific management and in part from the natural tendency to be more careful with materials as their cost increases, shop-owners and factory heads of every degree have seen the necessity not only of cutting down the percentage of waste material to the smallest possible figure, but of disposing of the unavoidable waste resulting from their operations to the best possible advantage.

Some industries have found fortunes in their waste-heaps and slag-piles, with the aid of the latest methods of analysis and treatment. The invention of new processes has made it worth while to go through the material cast aside as useless years ago at ore-mills, and redeem the small percentage of valuable metal found in low-grade ores. Instances of this sort could be multiplied without limit, but the point is plain enough.

The blacksmith can hardly expect to find gold in the waste-pile in the rear of his shop or in the corner where he throws his old iron. But it represents good money, as he knows to his cost when he buys new material and as he can prove by taking care of that pile of waste material and selling it to the best advantage. And it is with reference

to selling to the best advantage that something can be said right here.

The case of the owner of a big shop in a good-sized city is illustrative of this point. Being a big shop, the amount of waste matter, old horse-shoes and scrap iron of various sorts, which accumulated was considerable. The owner of the shop, of course, knew its value and saved the material for sale to junk dealers. He paid no particular attention to it, however, regarding it as a matter of very little importance.

"For a long time," he said, "my plan was one that I believe is still generally used around in this section,

saving their scrap-iron for Christmas money; and the junk-dealers who had formerly come around and bargained for our stuff finally got wise to this idea and stopped coming around for some time before Christmas. They knew we'd be wanting our Christmas money, and so they took a very indifferent attitude; waiting for us to show up and ask them as a favor to take the stuff.

"Naturally, the prices they offered were not especially good under those circumstances; in fact they were far from good, and it occurred to me that it might be a good idea to cut out the Christmas-money idea and follow the ordinary business policy of selling when the market was right. I proceeded to put this plan into effect, and the average prices I have received for my stuff since then show the profit there is in the idea."

This shop, as indicated above, is a large one which accumulates a good deal of material. The owner, therefore, has something of an advantage as compared with the smaller shop whose accumulation of junk is not large.

The plan which has been followed by a number of tanners in the same city has points in its favor which commend it to the attention of the blacksmiths.

The tanners have always taken care that no waste, in the real sense, is permitted around their plants. The trimmings from the hides, the hair and the tails, as well as all other matter of that sort, have always been preserved and sold to people who use that sort of material.

The difficulties experienced by the several single plants in handling this matter, however, were somewhat similar to those of the blacksmiths in disposing of their waste, profitably. The amount of material accumulating at each plant was relatively small, making it necessary to hold it for a long time in order to make a shipment worth while, during which time the market might fall to a point where the profit would be small as compared with a former figure, and other objections along



THE YOUNG SMITH

and I didn't see that there was anything wrong with it. My practice was to let the stuff accumulate until there was a good pile of it, when I would sell it. This happened about twice a year, and I fell into the habit of making sales in July and just before Christmas, the money coming in especially well at the latter time.

"Now, it happened, as I say, that practically all of the blacksmiths in the city got into the same habit of



the same line presented themselves, as compared with the ease with which a single large concern could take care of the business.

Therefore, the tanners took the only step which would solve the difficulty for them. They organized and duly incorporated a separate company to deal with the matter, turning over to it all of the offal from their several plants, receiving due credit and, in time, checks covering the amount of material turned in, less the expense of marketing it. The company organized for that purpose handled all of the business of marketing the waste, and by reason of the fact that it could nearly always make up a carload of material it obtained the highest prices and the lowest freight rates—both points of importance.

When the scrap-iron of a hundred or more shops is piled together the result is an amount of material which buyers would find it worth while to bid for, to the considerable advantage of the contributors to the pile.

A small central warehouse, a cheap horse and wagon and a man to take care of the business—this is all that would be necessary to start things moving on a practical

such times as the market rendered them advisable, under order of a committee appointed for that purpose.

The better the blacksmith, and more carefully conducted the shop, the less waste of any sort there will be—of time as well as of material. As long as there is necessarily involved some waste of material, however, and as long as old iron from the work handled accumulates, the man with an eye to his own interests will see to it that this material is handled in a manner as businesslike as any other part of his work; and this means nothing if it does not mean selling to the best advantage.

A Short Talk on Smithing Coal

L. R. SWARTZ

Good coal has a bright, clean color and is free from slaty streaks and specks of pyrites of iron.

When coal is coked, the coke should be rather soft and light, and should be capable of furnishing a good bright fire. Smithing coal should be "pick-mined," not blasted out, because the concussion and flash of the explosive jars and burns the life out of the coal. Coal that is otherwise good but has

best coal for making coke for blast furnaces is not good for smithing or for firing boilers.

It is my opinion that rusty coal that contains too much iron is as bad, if not worse, for use on the forge than coal specked with the pyrites (which look like specks of gold or silver). Both of these kinds of coal are apt to form more scale on steel or iron in the fire than coal that contains too much slate, and consequently destroy the carbon of steel to a greater depth than clean coal. Even with good coal, a shallow fire with too strong a blast from fan or bellows will often furnish the same results as the poorest coal. In fact the fires in most country shops are too shallow and the fire pot too small. In such cases it is generally the practice to try to make up for the small size of the fire by increasing the blast or, in other words, to substitute intensity for volume. If the fire is of proper size and properly tended, good coal will make little scale on the metal, and jobs that are otherwise very troublesome can be done without much difficulty.

The Blacksmith-Gas Engine Dealer

This is what *Gas Power* has to say on the subject of the blacksmith acting as a gas engine dealer:

"It is generally conceded that the village blacksmith shop is about the best known establishment in the town in which it is located, not only to the people in that particular town, but also to the entire outlying rural population, the majority of whom are obliged to patronize the blacksmith shop. In many localities the blacksmith plays a very important part in the work of making the gasoline engines what they are on the farm, for the reason that many shops are equipped with a gasoline engine, and the farmers, the majority of whom are of a mechanical turn of mind, become more or less familiar with its operation. The farmer realizes that the power-driven machines enable the blacksmith to perform a much greater amount of work than he could accomplish by hand, and naturally applies the same condition to himself, and it does not take very much of an argument on the part of the blacksmith to convince him that he, the farmer, is working under a disadvantage when he does not count an



THIS NEW YORK STATE SHOP HAS BEEN RUN BY THREE GENERATIONS OF THE SAME FAMILY. MR. FRANK M. DAVIS IS THE PRESENT OWNER

basis in any city or town where the blacksmiths have not seen the advantage of co-operative selling of their scrap-iron. Receipts by weight of iron taken from each shop would constitute sufficient evidence of claims against the funds resulting from sales; and sales could be made at

been shot too hard in mining behaves in the fire like coal that has been scattered on the ground and become weatherbeaten. It has about enough life left in it to make coke, and after that the fire becomes dull and will not raise a good welding heat. It is strange but true that some of the



engine as part of his farm equipment.

"It also would seem that the average blacksmith, who has a country clientele, is exceedingly short-sighted when he does not have the agency of a good line of gasoline farm engines, as a class of people are constantly calling at his shop who are the logical, actual consumers of gas engines.

"Of course, it is necessary for a blacksmith to educate himself thoroughly in the art of handling a gasoline engine, but its constant use in his own business makes him familiar with it, and he is always in a position to give a demonstration, not only of the operation but also its application to power-driven machinery, which is not always the case with the implement dealer. The blacksmith's training requires the development of ability to take things as they come, and to solve each mechanical trouble as best he can under the circumstances and it is too often the case where dealers, whose engines are not doing actual work, find it difficult to explain to their customers just exactly how the engine should be set up and the power applied to obtain the best results. In the case of the blacksmith, he is not only familiar with the engine he handles, but is usually quite familiar with nearly every make in his territory, on account of having done repair work, and is, consequently, in a better position to advise prospective gas engine purchasers than anyone else in the village."

The Business from a Practical Smith's Viewpoint—6

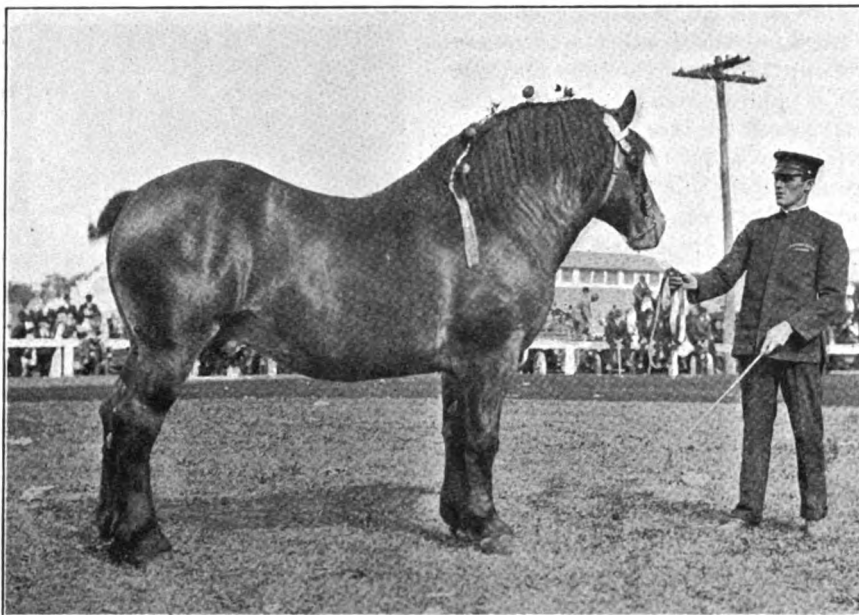
H. M. TOTMAN

Trade Organization

One of the most important requirements in our trade today is mutual effort. But some small country shop owner will say "How will this benefit my business away off in the country, miles from another shop?" And the proprietor of the large shop in city or town will remark: "I don't have to affiliate with others." Both of these conclusions are based on selfishness; not much different from fifty years ago when a man who had or thought he had a superior way of doing something was very careful to keep it a secret. Trade secrets were common then, but today, thanks to THE AMERICAN BLACKSMITH and other trade papers, we have become broader-minded. Now, if we

can but go a step farther and have a general system of trade organization, we can greatly further our own interests. In this age of development we cannot wholly ignore the "other

done; but he can claim his property. Our only recourse is to get the man who brought in the vehicle, and he has usually left for parts unknown. The question arises "What is to be



A FIRST PRIZE BELGIAN STALLION OF EXCEPTIONAL SIZE

fellow," and any assistance we render that will benefit him will, in the long run, benefit ourselves.

"In union there is strength." Can we not discover some advantages in united effort? Let us see. First: organization would mean a concerted action for legislation. Would it not be well to have, as a law, a mechanic's lien? In other words, a legal claim upon real or personal property for the satisfaction of some debt or work performed? I understand that such a law is in force in some of the States. I believe it saves many accounts. As it now is, if we make delivery we have no way of collecting except by suit, judgment and execution, and in many cases the debtor claims exemption entirely, and we have another item on the "bad debts" account. Exemption should not be claimed against a lien, nor should it require a suit in courts. Now, if we hold the job for the account, we are usually safe. I say "usually safe," because there is one case where we cannot hold the job for the bill. For instance, a stranger brings a broken carriage for repairs. The wagonmaker does the needed work, marks it C. O. D. and rests easy. In comes a livery man and claims the carriage. It is his. Of course he did not order the work

done?" Fortunately we have two alternatives: Give the owner the job and lose the account, or remove all the material that has been used on the job for repairs and return it to the owner in as nearly the same shape as it was received. In the latter event the owner will quickly discover that it is better to pay the bill and have an article that can be used. The writer has had just such an experience as this. But if we were thoroughly organized we could bring enough pressure to bear upon our legislators to enact this lien law.

Secondly:—Organization makes us better acquainted with each other, and we usually find that the other fellow is a pretty good sort of chap and that his mistakes are of the head and not of the heart. No matter how great our knowledge and experience may be, we can always learn something of value from our competitor. No matter how crude a man may be, he has his friends. In any given locality the custom work will be done (at least the greater part of it) by the local shops, hence, it follows that every one will get his share if he does business on the level. High prices, if accompanied with superior work, never drive trade away, on the contrary they attract the most desirable and profitable business. The best



competition is that which tends to raise the standard of both price and quality. And it requires no argument to show the desirability of high standards in anything.

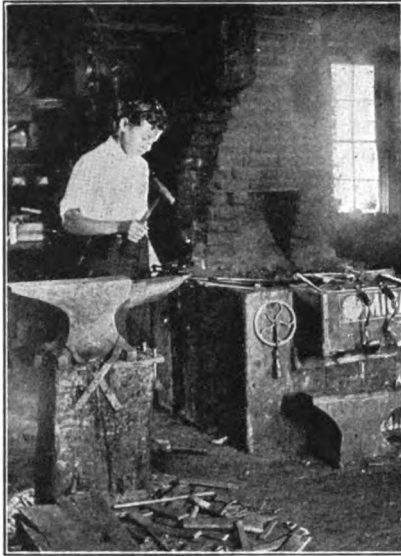
Third:—Organization is desirable, in that through it we are enabled to weed out the deadbeats. Suppose that all the shops combine and one man is made secretary. All the members report to him once a month, giving him a list of delinquents. A stranger drops in and has some work done and requests credit for a short time. Before consenting to give him credit inquire his name and where he has been getting his work done; then call up the secretary for a report on him, and if you learn that he has a considerable unpaid account with another shop just tell him that you don't care to open any more accounts at the present time. Nor can he get credit anywhere until that old account is paid. The result is you are very apt to gain a good customer (the best are the ones who pay cash) and you save a bill. Another important and essential point is that we be perfectly frank with the customer; frank, but courteous at all times. In this way you will gain his respect, and that is a long step toward securing his trade.

Fourth:—Money can be saved by shops combining in purchases. For instance, few of us can purchase a carload of smithing coal at one time, but two or three can unite and get a car and divide the contents, and the cost will be little more than one half the retail price. The same applies to iron, steel, and so forth.

Fifth:—Organization enables us to arrange a *minimum* scale of prices; but, of course, get as much more as you can. In this we must be perfectly frank and honest with each other, owing to the fact that shops differ in facilities for doing work and in the character of work demanded by their trade, prices will not be exactly uniform. But no price should be so low as to cut out all profit. We have known of customers going from one shop to another quoting prices given, and sometimes not telling the truth. We have also known proprietors who would not maintain prices as agreed upon (more "fibbers"), but in the long run they don't gain a great deal, because cut prices generally mean an inferior grade of work, and the trade will eventually learn this. In fact,

it is a campaign of education from start to finish.

Sixth:—Organization benefits socially. I know of no more pleasant sight than to see a group of happy men with their wives, families and



A YOUNG BOY AND AN OLD FORGE

sweethearts out for a picnic or a good time. This is only an incidental benefit, but man is a social creature and needs pleasure as well as work. On the whole, co-operation and mutual organization are accredited benefits from every angle of consideration, and should be discussed and entered into by all the smiths wherever located.

In closing this series of articles, we realize that much more might be said upon all of the topics discussed, but if any of our brothers of the anvil or jack plane, scissors or brush, have received any ideas that will assist in making them more successful as business men or more efficient as workmen, or more contented with their sphere in life, then these articles will have accomplished the purpose for which they have been written.

Some Hints on Power Plow Work

J. H. HUDSON

A very little mistake or error in sharpening, shaping or adjusting gang plows will increase the draft and thus increase the power and fuel necessary to pull them. To tell whether or not a lay is properly shaped, place it on the floor or bench just as it would rest in the furrow. If its entire cutting edge touches the floor it is set right.

If it does not, it is not right. There should, however, be no wide surface at the heel or wing of the lay, as this will make it difficult to set the plow deep into hard ground. It must be understood that these lays are not like those of a walking plow. They do not have to carry the "weight of the suction." Neither should these lays polish the bottom of the furrows as does a walking plow. As the lay sets on the floor or bench, the heel of its landside should stand about one half an inch above the floor. This will show that it has the proper amount of suction. The point of the lay should also swing a little to the left of the line of the landside.

The edge of the lay should not turn up. If it does it will interfere with the scouring of the lay and will increase the draft of the plow. Among other things that may affect the scouring of a plow are: The softness of both lay and moldboard may prevent their taking a good polish. Then, a rusted plow will not scour well. A plow not in use should be greased, so as to preserve its bright surface. Again, a rough hammered lay will not scour well, because of the numerous little hollows and indentations. These rough places should be ground and polished.

The smith, by knowing something of practical plowing, can more easily satisfy his plow trade and more readily give his customers what they want. It is almost necessary to know at least something about plowing and how the plow does its work, in order to do satisfactory plow work and repairing.

A Young Boy and An Old Forge

A. S. GEDDES

A prosperous general smith located in a thriving Massachusetts town was worried and grieved despite his business success. His success in business was o'ershadowed by his failure seemingly to interest his fifteen-year old son in any serious pursuits. The boy, healthy both in mind and body, was listless, without apparent ambition and moreover behind in his studies at school. He seemed to take little interest in anything. The natural fascination which the glowing forge has for most persons, and especially for a boy, soon gave way apparently to contempt by



reason of his familiarity with the shop and its surroundings.

Another factor which assisted very materially in dampening his ambition and in lessening his enthusiasm for the forge and shop was the apparent innocent remarks, jokingly made, regarding the boy's ability or rather lack of ability as a smith. The father tried on several occasions to get the boy interested in smith-shop work after school hours and on Saturdays. But the jibes of the experienced workmen were too much for the youngster and nothing would cause him to take up the work with any seriousness.

Finally, the father, discouraged and disheartened, gave up the problem. His new shop, now made necessary by reason of his growing and increasing business, did not produce the elation it should. There seemed to be comparatively little satisfaction in a new, modernly-equipped shop when one's fifteen-year-old son appears to have lost interest in things generally. The father was evidently so affected by his failure to arouse his boy's interest along proper channels that he apparently forgot all about the old shop. At least, he did nothing concerning it, and the old shop with its brick forge, its marred anvil and its assortment of odds and ends remained as it was on the day the new shop opened. In the newness and novelty of the modern shop the old one was unnoticed and so, naturally, the father knew nothing about the hours which the boy spent beside the forge of the old place. He knew nothing about the youngster's persistence, his continued trying and

his discouraging failures. He knew nothing about these things until one day, when the boy brought for the father's inspection a score of links, an anchor and other samples of welded work. These the boy offered with the enthusiastic exclamation: "I'm going to be a blacksmith!"

The boy is now employed after school and on Saturdays beside a forge in the new shop. He has silenced the discouraging jibes of the workmen by showing them forgings that compare favorably with their own. And the father rejoices in a success that appears to outweigh his business success, at least in its personal satisfaction.



Queries— Answers— Notes

Wants Length of Wood Axles.—In regard to my inquiry in the November issue as to the proper length of axles, would say that I was referring to wood axles, and I would be pleased if some brother would give me this information soon. I desire to thank Brother Peterson for the information he has given on iron axles.

W. E. RIFFE, Kentucky.

A Query on Mule Feet.—I would like to know what to do for a mule's feet that have

become hard as rock and don't seem to grow. There are twenty-two mules at the mine where I am employed and not one of them has any frog, and did not have any when I started to work here. It occurred to me that possibly the sulphur water has something to do with this condition. I would like to receive information on this matter through the columns of the paper.

RICHARD CALLIN, Maryland.

A Handy Wagon-Jack.—The engraving shows an easily made wagon-jack that is useful in the wagonmaker's shop. The material is 2-inch by 4-inch lumber. The short arm at the left is strengthened by an iron brace. The arm that swings the jack is, of course, made of iron, and the forked eye upon which the end of it works is iron nailed on the board. All the hinged arms are simply bored, and an iron bolt passed through. Bushings may be provided if desired. These will save excessive wear on the wood hole, which will in time become elongated. The base of the jack is 3 feet 3 inches long, the short arm or standard at the left is 10 inches high, and the right wooden arm is 22 inches in length. The iron arm is also 22 inches long. The engraving illustrates the jack in its two positions.

SCOTT HIBBARD, Kentucky.

Brazing Cast Iron.—Poor Coal.—I would like to have Mr. Benton give me a formula for brazing cast iron successfully. I would also like to have him give me a remedy for poor coal that is full of sulphur. Is there anything that could be put into it to destroy the effects of the sulphur on the iron?

JAMES H. SWEET, Ontario.

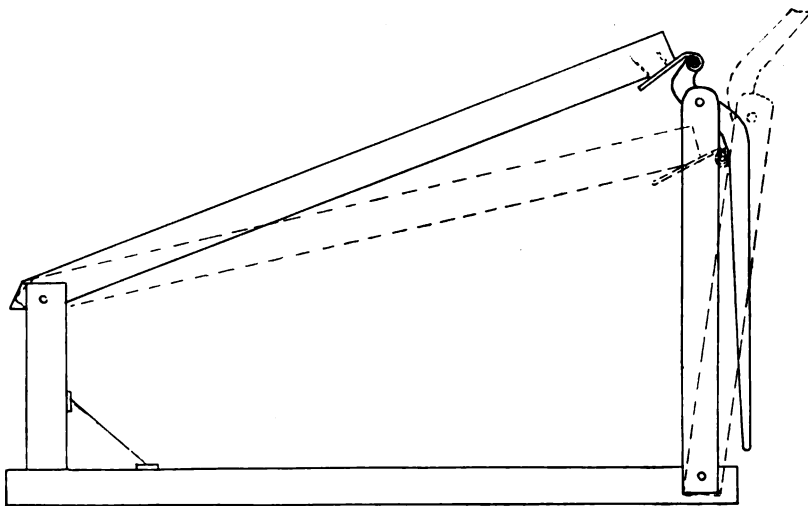
In Reply.—The main point in brazing cast iron is to have the ends of the pieces to be brazed perfectly clean. See that the edges fit perfectly and don't use a file in cleaning—use a stiff brush. When the pieces are as clean as possible, a fresh fire is built. Don't use a fire in which you have been heating tires or shoes all day. Allow it to burn several minutes before putting the work in, and then place two or three large pieces of charcoal on top of the break. When heated to a cherry red on both sides apply some good, clean borax to the break, assisting it to flow with a long-handled spoon. Immediately after, the spelter (brass) is placed on the break, cutting down the blast so as not to burn the spelter. The broken ends should be clamped as tightly as possible, as the spelter will run in without difficulty. As the flux and spelter run in, increase the blast. When the spelter has flowed all around the break and thoroughly filled it, cut off the blast and allow the work to cool in the forge. The spelter can be purchased in powdered form and thus is easily mixed with the borax.

As to coal being full of sulphur, there is nothing to remedy this difficulty. The sulphur is there and there to stay. The only way is to get good smithing coal—coal that has a known standard. It may be more expensive, but is eventually cheaper than spoiling a lot of good work by trying to doctor up poor coal. The articles concerning smithing coal published in recent issues, in which several smiths give their experiences, bear out this testimony.

BENTON.

Some Wheel Suggestions.—A Portable Drill.—Why do makers of buggy wheels put a hole half way between each pair of spokes for tire bolts? This weakens both tire and rim and causes a flat place in the wheel between every two spokes—thus making a sixteen-sided wheel.

Why not have a short flange on each edge of the tire to keep it on, instead of using eighteen bolts? I think the tires could be made of oval iron and put on wider than the rims. The edges could then be



AN EASILY MADE WAGON-JACK THAT SHOULD PROVE USEFUL IN THE VEHICLE SHOP



crimped by running between rolls. This would make a neat and lasting job and also save the tire bolts and prevent the rim from breaking down. For heavy wagons I would

never read a paper that is such a help to the craft as THE AMERICAN BLACKSMITH, and I take this opportunity of extending my best wishes for a prosperous year.

J. E. MAYS, Wisconsin.

Australian Carriage Builders' Convention

Interesting Paper by Mr. Dash

The eleventh Annual Convention of Carriage and Wagon Builders of Australia took place at Hobart in December. Representatives and delegates from all parts of the Commonwealth were present; and a most successful and enthusiastic convention and succession of meetings resulted.

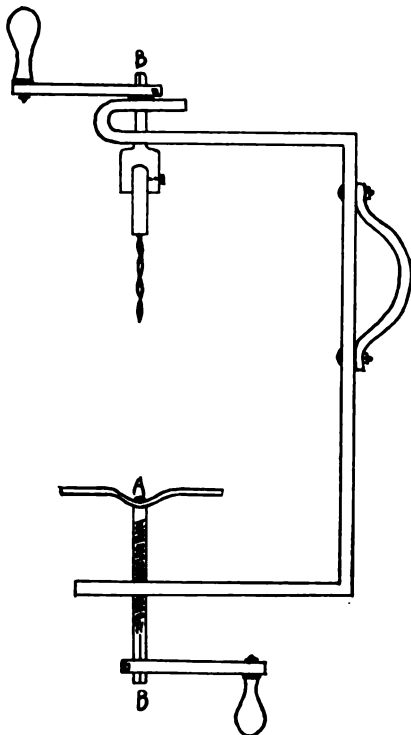
It is, of course, impossible to give space to all of the important matters discussed and to publish all of the papers read. However, we cannot refrain from publishing some extracts from the very interesting paper by Mr. George Dash. Mr. Dash's subject was: "Why Are We In Business?" He dealt with the social aspects of business, and he himself, it is understood, runs his business on a co-operative basis with his employees who have shares in it. Mr. Dash in his paper said that in 99 out of 100 cases the business man was in business to make money, and even the hundredth man could be included. Still, he said, the question of "Why are we in business" could not be answered so easily as that. Men were in business to make profit, but he translated profit to mean much more than pounds, shillings and pence. Business men should be out for profit not only for themselves, but for their employees, their customers and agents. "A satisfied customer is a permanent customer," said Mr. Dash, "and a satisfied, permanent customer is a valuable advertisement."

Then, continuing, he said:

"Given a normal man in a business he likes, and in which he is making a living, and perhaps a little more, that business should bring him happiness in its conduct. There is happiness in pitting yourself against the

and brings moments of pure joy, for there are incidents in business which are funnier than many staged comedies. There is joy in many a client if properly viewed, though at first sight there is nothing but the bothersome. The man who, when you offer to exchange your £10-cart for his £3-cart and £7 in cash, blandly says, "I'll gie ye fower pun," is a vexatious item, perhaps. But is it not laughable when, declining that deal, you offer him another cart of the same value, but, apparently, much better, and say to him, 'Here is a cart I will swap for your cart and £11, and he beats you down and down, and finally departs with the cart, leaving you his £3-cart and £7. Don't you find a joy in having given that adult child value for his money, and in having extracted from him money for your value? When a man who bought an old cart from you five years ago comes back and wants to be allowed in an exchange a £1 more than he gave you for the cart, and hides his purpose beneath a fluent laudation of the good points of that same cart, you surely, as you gently mention the age and amount of the former deal, enjoy the joke.

"My husband gave me £1 to pay you on the cart, Mr. Dash, but—er—I've been shopping, and—er—would you mind taking the 15s. I have left?" is screamingly funny when properly viewed. Then, too, the harmless and necessary commercial traveler is to the weary business man at times a mine of fun. Do you not enjoy, every time you meet him, the new young man on the road. He blows in, filled to the brim with Yankee salesman stunts, and, breezily greeting you, fixes you with mesmeric glance, and in tones modulated to deepest depths of confidential secrecy, lets you know that, in order to open an account with you for his firm, he will now quote you a few lines at prices that will leave all previous quotations shuddering. Humbly preparing for the shock, you lean forward to receive the breathless communication that shall open up possibilities of profit prodigious, and as that glance mesmeric flashes from price back to you, and back again with electric



A PORTABLE DRILL SUGGESTED BY MR. W. V. GIST

suggest corrugated tires—deep and sharp corrugation on the inside. The iron would sink into the wood and the wood into the iron and thus save bolting on.

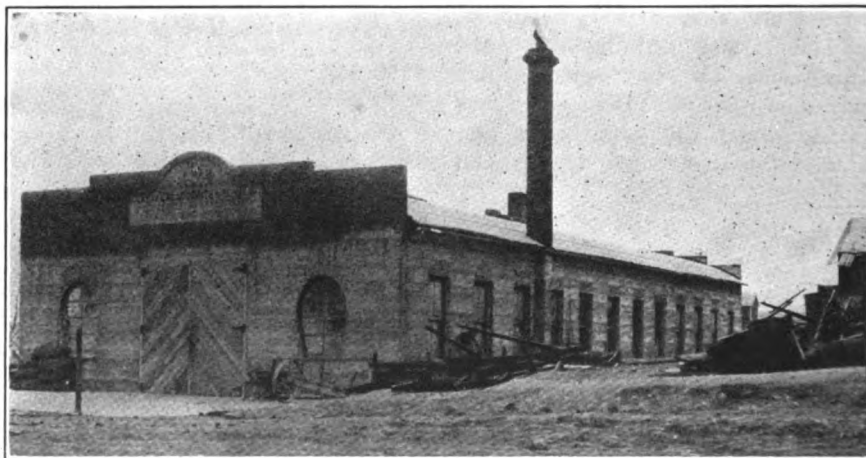
The engraving pictures a portable drill that is used for drilling holes in wagon skenes when the threads have given out, and to key on the nut. It is handy for various other jobs. The Feed Crank, A, is swiveled in the rest. The two ends, B, B, are squared, and cranks with an adjustable square hole are fitted on each. The frame is made of 1½ by ¾-inch iron.

WM. V. GIST, Tennessee.

A New Wisconsin Shop.—The engraving shows the shop I built this past summer. It is 32 by 80 feet, and is built of concrete with a self-supporting roof; the inside of the building containing no posts whatever. There is one chimney in the wall as shown. We have two forges built of concrete ten feet from the wall. These are connected to down draft leading to the chimney under the floor. The door is made 9 by 8½ feet, so as to permit of almost any kind of machinery being taken inside the shop. The building has 26 windows with 12 by 28-inch panes, two front windows, 3½ by 5 feet, and a skylight, 4 by 5 feet, over the anvils.

I built this shop myself with the assistance of my helper and a carpenter. We also kept up our regular work which amounted to \$50.00 a week at the old shop. But we were obliged to work early and late in order to accomplish what we did. I made a concrete mixer which I ran with my engine to mix the concrete. The walls are re-enforced from top to bottom with iron and wire. The floor is built level with the street, so that there is no incline when going into the shop. There is also a space arranged for a garage on one side.

In closing, I wish to repeat what I have often said before, and that is that I have



THE NEWLY COMPLETED CONCRETE WISCONSIN SHOP OF MR. J. E. MAYS

many difficulties of the game. There is happiness in watching your plans mature. There is happiness in organizing plant and system, and watching its work. There is happiness in pitting yourself against the man who seeks to profit at your expense, who seeks from you a money profit that brings you a money loss. I grant you that the gift of humor is helpful,

swiftness, and you learn that the price divested of the glamour of 'hints on salesmanship complete in one volume' is just a trifle more than what you are already buying the same goods for, you surely do enjoy the joke, and greet with inward chuckles the same old gag in the new actor.

"That usually exasperating item, the warehouse error, brings at times its meed



of entertainment. 'Here, Mr. Sellem,' said I one day to the representative of a wholesale house, as he stepped into my office, 'what about that axle cap I handed to you last month?' 'Well, as a matter of fact, Mr. Dash, I have been carrying it around with me ever since.' He produced the cap from his bag as he spoke. 'Well, that's all right, but listen to this. I wanted that cap back again, and wrote your firm for it. A cap was sent me which differed essentially from that one, and I wrote about it. Of course, as you had it in your bag they could not send it to me, but this is what they wrote: 'Dear Mr. Dash, you are in error as to the axle cap not being the one you handed our Mr. Sellem, for our storeman tells us that we have no other cap of that make in stock, and assures us that he has had it on his desk as a paper weight ever since it was returned.' Did we enjoy writing to that firm? Rather! 'Tis well to appreciate those humorous interludes wherein you yourself figure as the joke. Yes, there is much that is enjoyable in the humour of business, but the happiness of business lies in the exercise of your organising capacity, in the perfecting of your methods and your plant for the production of the graceful, the useful, and the saleable, and in perfecting your system of handling your advertising and your business-bringing and holding to complete the circle of activity. The money profit cannot buy character, but the development of a business character is one of the gains without which business is a failure. The development of one's own character in business is of great importance and value. The effort to eliminate the petty and the mean, and to cultivate the tolerance and the charity necessary to the developed man is one of the activities of good business. The development of that backbone which enables a man at all times to withstand business that brings a money profit at the expense of character; to withstand business that brings a money profit, but calls for a denial of our convictions, the cultivation of the sturdy, independent spirit that lifts one into the ranks of men respected for their probity and honoured for their principles, is one of the profits of business that is valuable, though not monetary. A business profit is this development of character; not ending with ourselves, but extending through our little kingdom. Our employees are for a proportion of their lives entirely under our influence, and may develop character or may deteriorate as we incline. To be able to say at the end of a period that one has made money may or may not be a laudable result. If, while one has made money, one has planted one's foot on one's workmen, if the human machinery with which one wrought is but fit for the scrap heap, the glory of having made money has departed. If you can say, with just pride, 'I have made some money and I have developed men.' If you can say, 'I have cultivated in my workmen the spirit of fairness that impels them to return a good day's work for a good day's pay, even when my oversight is temporarily removed; and have made some money.' If you can say, 'I have lifted my men from the ranks of those who listened open-mouthed to the agitator, and have cultivated in them an understanding of the necessity for the creation of capital, or the means whereby they may accumulate capital, and have taught them that while labour has its rights, capital is entitled to its reward; have, in fact, planted in them the seeds of business knowledge; and have made money.' If you can say, too, that morally your men have profited by their connection with your business.

If they are sturdily independent, proud of their rights and privileges, while they recognize and acknowledge yours, if they have learned from you no vicious habits and no meanness of heart or narrowness of spirit; if they have, in short, become, in contact with you, good, clean, useful citizens; and you have made some money, then you have much to be thankful for and something to be proud of. Why are we in business? For a money profit to ourselves and those with whom we do business. For a character profit to ourselves and those with whom we deal. For happiness, which comes with the accomplishment of these other two."

[EDITOR'S NOTE:—Mr. Dash's paper is well worth reading and, while written from the viewpoint of a New Zealand Carriage Builder, the truths, sound, practical sense and the true human spirit of it, is applicable in any country on the globe. There are many of "Our Folks" who will read and re-read Mr. Dash's paper and profit by it.]



The Automobile Repairman

How to Tighten Lock Nuts. In most instances the lock nut is merely drawn down tightly upon the first nut, the presumption being that the second nut has some special virtue of its own that will prevent it from loosening. As a matter of fact, two nuts used in this way are no better than a single nut of equivalent size. The proper way to lock two nuts together is to tighten the first as far as it will go and, having run the second down upon it, to give the first nut a backward jerk, while the second is held securely with a wrench. When this is done, the lower nut rotates as far as is permitted by the back lash between its threads and those on the bolt. Two nuts thus engaged take up all the back lash in the system and are securely locked, since without a working clearance, infinitesimal though it may be, it is impossible for the two to move relatively to each other. A quite important point in this connection is that the usual order of things should be reversed and the smaller nut be run on first. This should be done, since it is the outer nut which takes the greater strain and supports the load. Probably it is the inconvenience of turning the thinner nut that has caused it to be run on last.

To prevent grease cups on universal joints and the like from constantly working loose, as they have a tendency to do under the influence of the centrifugal force set up, it is recommended that after they are screwed up into position they should be set by means of a center punch.

The aluminum parts about a car can best be cleaned with a bit of waste or cloth

dampened in turpentine. If the parts are well rubbed with a cloth thus dampened, so that all tarnish and foreign matter are removed, it will be found that these accumulations will not form so readily thereafter.

With engines that are hard to start, it is common practice to inject a little gasoline into each of the cylinders, as this performs the double office of providing an explosive mixture and also of freeing the piston rings, which may have become somewhat gummed after standing for a few days. A good many engines, however, have no compression taps, so that gasoline cannot be injected this way, but it often happens that these engines have automatic carburetors—that is, carburetors with spring controlled air valve—and it is common practice to pour gasoline into the air valve, as this is close to the engine, and the engine will suck gasoline from here when it will not pull gasoline through the jet. This is all very well, but one precaution should be observed on the engines which have the magneto on the same side as the extra air valve. Should any gasoline be spilled when pouring it into the air valve, the magneto, as soon as the spark is obtained, is almost sure to ignite the fumes, so that if there be the least risk of any gasoline falling on or near the magneto when priming the air valve it is desirable that a cloth should be thrown over the magneto during the operation to serve as a protection.

When a mysterious loss of power occurs with a car that has seen some use, do not omit an examination of the exhaust box. A foul exhaust outlet makes a very efficient power absorber.

One of the most common errors is in neglecting lubrication of small parts, and nearly everyone will see that the motor is given its regular quota of oil and that the transmission and rear axle are properly filled, but the lubrication of such things as fan, front wheel, steering connections, spring link and various lever bearings is entirely lost sight of. Manufacturers place attractive brass oil and grease cups at all important points of the car where it is practicable to do so, in the hope that they will be noticed and used, but in too many instances the result is not attained. Not only is lubrication neglected, but a cheap oil is used merely to save a few cents per gallon. This one thing often results in repairs of a very expensive nature.

Before using a hose on a radiator to remove any mud which may have collected thereon, it is a good plan to place a tarpaulin or some similar object across the rear side of the apparatus. This will prevent the water from squirting through the tubes and becoming splashed on the carburetor or magneto.

Carbon Monoxide—A Warning. The following case of death from carbon monoxide poisoning is reported from Chicago and it is well, we believe, to call attention to it as a warning against an ever present danger to those who run the motors of their cars in closely shut up garages. A physician was cleaning the muffler of his car by pouring wood alcohol and kerosene into it. The doors of the garage were closed, and when he started the engine and opened the cut-out, the fumes overcame him so rapidly that he was barely able to reach the door and open it. He was taken to his room, where he lapsed into unconsciousness and died the next day. The autopsy revealed that death was due to poisoning by carbon monoxide, causing cerebral hemorrhage.

In soldering flexible cables, if possible avoid the use of a flux containing acid. Such a flux will creep up between the fine wires forming the cable and corrode them, in time completely eating away the wire



and breaking the circuit. Rosin dissolved in alcohol is a good flux for such operations.

Right and Left Threads. It should be remembered that all threads are not "right-handed," and, therefore, that every nut cannot be loosened by turning to the left. Lock nuts on the axle usually tighten up in the direction in which the wheel turns when the car is running forward, the nuts on the right side of the car being right-hand and those on the left left-hand. It is well not to forget this, since many a thread and nut

pressure which is due to the constricting of the stream of exhaust gases and to breaking them up. When a deposit lines the walls it becomes necessary after a while to use a cut-out. This is particularly true on small motors where the power loss may be as great as 35 per cent in case of dirty mufflers. The remedy is obvious.

In tightening battery and coil terminal wires there is a right and a wrong way. The right way is to twist the bare part of the wire or cable round the terminal in a

when climbing long hills on hot days, fills the radiator, and puts a certain pressure above atmosphere upon it, so that if there are any weak places the radiator is certain to commence to leak. It would hardly seem probable that the vent pipe should choke sufficiently to permit any pressure to be generated in the radiator, but the fact remains that these vent pipes do choke in this way if they are neglected, as a certain amount of sediment gets into them from the water, and that, combined

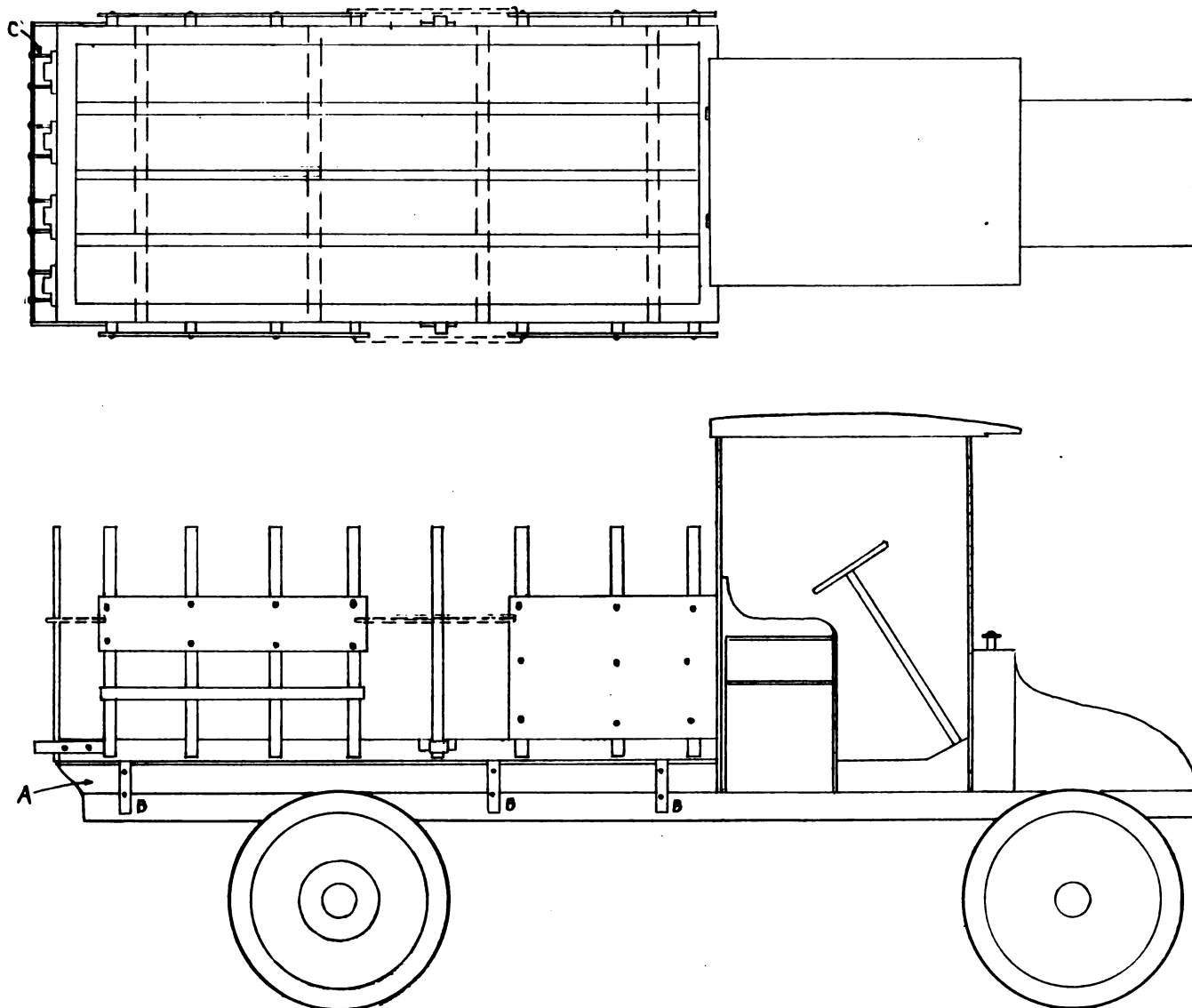


FIG. 1—THE TOP OR PLAN VIEW AND A SIDE ELEVATION OF THE AUTOMOBILE TRUCK

have been ruined by trying to force the nut off by tightening it. Of course, most nuts, bolts, and studs are of the "right-hand" variety, but there are exceptions.

Most of the parts of automobiles are occasionally cleaned from necessity rather than choice, but the muffler is frequently entirely neglected. To the average blacksmith, the muffler is simply a sheet-iron case which by some means prevents the noise of the exhaust from becoming a nuisance. Consequently, the interior of most exhaust boxes after a time resemble a coke oven and when eventually taken apart is far from a pleasant thing to handle. The deposits can sometimes be removed with a brush, but a scraper is needed in most cases. Most mufflers create some back

clockwise direction and then tighten up the terminal nut. The reason for this is that as the nuts have right-hand threads, the fact of tightening up the nut tends to pull the wire round more tightly. If the wire be twisted round in an anti-clockwise direction, tightening up the nut tends to uncoil the wire and it will slip from under the nut while it is being tightened or when the vibration of road work comes into play.

In replenishing the radiator it is always advisable to fill it slightly above the vent or overflow so that one can assure one's self that the vent pipe is not choked. An English writer says that if the vent pipe be allowed to become completely blocked it is bad for most radiators, as an accumulation of steam, which is very general

with grit, seems to make a sort of plug of hard, almost cement-like nature, which completely seals the vent. So many radiators are more or less delicate that the matter is well worth bearing in mind.

Replacing pistons in their cylinders is sometimes attended with considerable trouble, due to the difficulty of starting the rings into the cylinder bore. A turn of fine steel wire should be taken around each ring, and the ring compressed below the level of the piston surface. Clip the wire after the edge of each ring has entered the cylinder.

The outlet pipes from the mufflers in some cars are so placed that the products of combustion are directed against the rear axle or some other painted part, with the result that the latter is soon covered with



soot. The evil may, of course, be overcome by bending the pipe so that the direction of the outcoming gases is altered.

The clouding of sight-feed glasses which very quickly become opaque can be prevented in a very simple manner. The cause of the trouble is that the heat of the lubricating oil in the crank-chamber generates a smoke which gets up the oil pipes and renders the glasses opaque. To prevent this make a U-bend in all of the oil pipes at some point in their length where they are horizontal. This will make what plumbers term a "trap." The bend will make no difference whatever to the flow of oil; it does not obstruct it from going forward to the crank-chamber, but the smoke cannot return.

When replacing a broken ball of a bearing set it is best to renew the whole set, for the reason that the new ball although supposedly the same size is not so actually. The old balls are sometimes two or three thousandths smaller, according to the amount of wear the bearing has had.

The little clips which are mounted on the outer ends of the long leaves in semi-elliptical springs should be kept drawn up tight and firmly secured at all times. Their office is to prevent the leaves from getting out of alignment and to act as shock absorbers by bringing the outer leaves into action on the rebound as well as by increasing the friction between the leaves.

Building an Auto Truck Body

NELS PETERSON

This auto truck is built especially for delivering goods in cases. There seems to be quite a demand for this class of vehicle by business houses in all lines, such as drygoods, butchers, groceries, creameries, transfers, commission houses, etc. The blacksmiths who make a business of building and repairing wagons can take

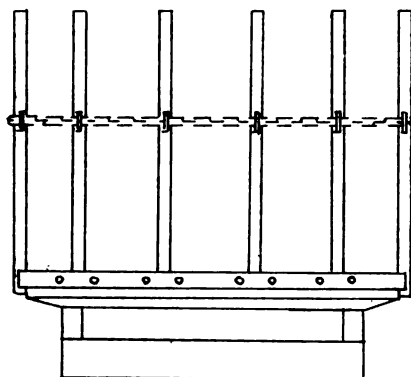
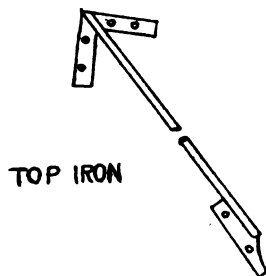


FIG. 2—DETAILS OF MR. PETERSON'S TRUCK BODY

up this work in addition to their regular line with profit. In fact, many are doing so in the larger cities. While auto trucks of every description are

at the rear end as shown in Fig. 2. A bumper iron made of 2-inch by 1/2-inch stock projecting 4 inches back of the stakes is fitted around the rear

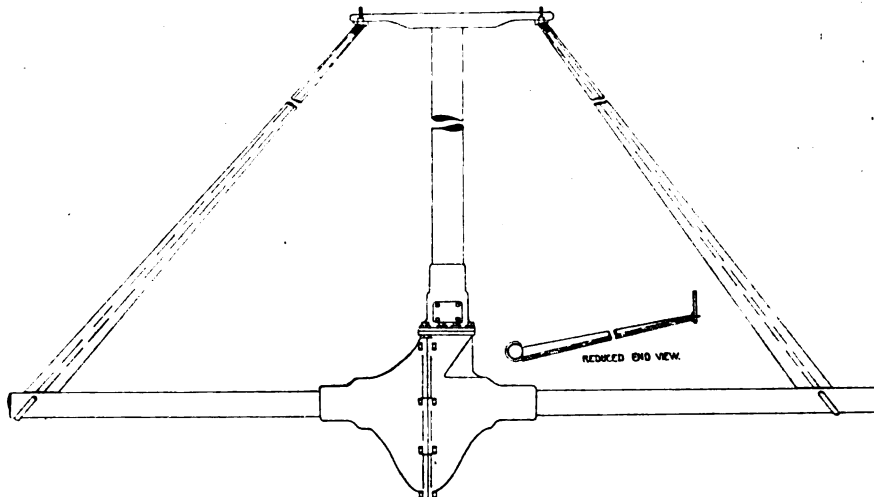


FIG. 1—HOW MR. SWARTZ REPAIRED THE BROKEN RODS

built by manufacturers to suit any particular line of business, yet it is a fact that when the business man wants an auto truck of special size that will fit a certain number of cans, boxes or cases of a given size, nine times out of ten he must have it made to order. The blacksmith shop equipped for wagon work is the logical place for handling this work.

There are a number of auto truck manufacturers who sell chassis of all sizes and capacity ready for the body, and an agency can be procured in any locality for some of these makes. The accompanying engravings show how a special body was made for a regular stock chassis. We build them in any and all sizes and styles.

Fig. 1 is a side view of the body, showing how it is attached to the chassis. The sills are four inches high by nine feet long and rest on two risers, marked A in engraving. These are securely fastened to the channels by means of three corner irons on each side, marked B. The stakes are bolted to the sills on the sides, except one which is set into a stake pocket and held in place with a chain. This can be removed for convenience in loading and unloading. A plate of 3/8-inch tank steel is bolted to the three front stakes as shown, which form the sides of the boot. Another plate of the same size steel is fastened to the four rear stakes for a sign board. The width of the body is four feet two inches inside of the stakes. Four stakes are set into pockets and held in place with a chain

end. This is fastened on by means of a number of short lengths of plugged gaspipe with holes bored for 3/8-inch bolts as shown at C. The bottom boards with the ends resting on the front and rear sills are supported with four crossbars as indicated by dotted lines. They have strips of 1 1/4-inch oval iron running lengthwise and fastened with wood screws. These cover the joints of the boards and make easy sliding for the cases. A top provided over the seat is fitted with curtains (not shown), to protect the driver from the elements, and is bolted to the two front stakes. Two top irons shown in Fig. 2, holding up the front end of the top, are made of 1/2-inch round iron with a plate 2-inch by 1 1/8-inch welded at the bottom end, by means of which it is bolted to the dashboard. Another plate at the top end is bent into the shape of a corner iron for bolting it to the inside corner of the top. This completes putting the body on the chassis. It is not a hard task to build one, but requires skill and originality combined with patience.

Three Emergency Automobile Repairs

L. R. SWARTZ

Torsion Rod Repair

An auto came struggling up to the shop one day with the rear axle torsion rods, which are attached to the transmission shaft and differential case, broken. The owner wanted the



ends welded on the torsion rods "right away." Of course it was out of the question to effect an immediate repair, because the torsion rods were "made up," i. e., made of tapered steel tubing pinned and brazed to the axle case at one end and threaded studs brazed into the other end of the tubing. It was impossible to take all these parts off and weld the ends on or even braze them on "right away."

So I took a small rod, ran it into the ends of tubing under the axle case and found that the studs extended into the small end of tubing about $2\frac{1}{2}$ inches. I sawed off the tubing even with the ends of the studs and then cut sleeves from $\frac{3}{4}$ -inch pipe to make up the proper length. I then fitted two $\frac{5}{8}$ -inch steel rods to pass through the tubing and form studs at the other end to fasten to transmission case, as shown in Fig. 1, (Page 181.) I hooked the rear ends of the rods around the axle case, slipped on the sleeves and then

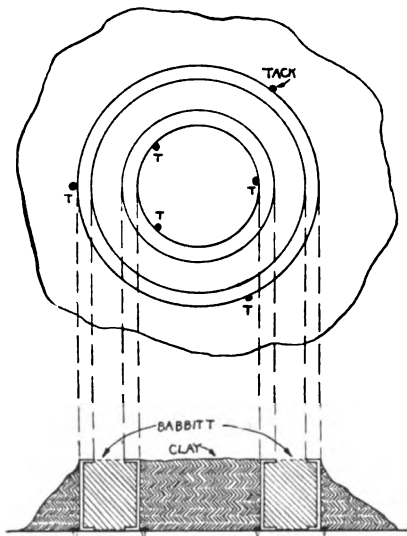


FIG. 2—A BALL BEARING REPAIR

a couple of washers back of jam nuts on threaded end of rods—and the job was done.

A better way would have been to forge and thread a couple of shouldered studs into the ends of tubing. I did not have just the stock I wanted for this plan and took the shortest way out. In emergency repairing, one seldom has a chance to do a job right. "The sooner the quicker" is mostly in demand. I have made up several parts to have on hand for hurry-up jobs—I have nearly all of them yet, and some of them are three years old.

Ball Bearing Repair

It is sometimes necessary to replace a bearing in which an odd sized ball is used. If you have not a bearing on hand that will fit, the best procedure is to get the shaft into line, lute up with clay and run a bearing with good non-friction metal.

Last summer a car was hung up because the ball bearing on the transmission shaft was played out. The parties heard that I could fix it. They came down, bringing the steel cage that held the balls and space. It was a freak piece of machinery. I found that if I could center the parts of the container and make a pour it would work—as the whole thing ran in oil. I centered the parts on the bench and made a good clay dam and cast the ball space full of good babbitt, then smoothed it up and it worked all right. Otherwise the car would have had to stand for a week or two until a new bearing could be found for it. The annular space between circular sections was poured inside of inner ring and also clayed outside of outer ring. The tacks held both sections in position. Sections of parts are shown in Fig. 2.

The car climbed three miles of mountain and was going all right 20 miles west when last heard from.

Repairing Broken Cylinder

One day a re-built Maxwell car refused to work at the foot of a $3\frac{1}{2}$ -mile grade. Water poured out through the muffler from the exhaust. We pulled the car into the shop, removed the cylinders of the engine and found that a wrist-pin bearing had overheated, run loose and allowed the babbitt to double up at the end of the connecting rod. This made the rod about $\frac{1}{4}$ inch too long. When the piston came forward on its upstroke it hit the stub of the gate through which the metal had been poured when the cylinder was cast and made a ragged hole in the inner head about 2 by $2\frac{1}{2}$ inches. This hole in the cylinder head, of course, allowed the cooling water to run into the cylinder and out through the exhaust. I plugged all the connections with clay, as shown in Fig. 3, and heated the cylinder head. We then tipped it over a little and made a pour of babbitt metal so as to completely cover the break on the inside, and thrust the piston into the cylinder as far as it would go before the babbitt set. We then calked the babbitt and

scraped all around the edges of the pour and then ran solder all around the babbitt with a heavy soldering copper. A good coat of shellac would have answered as well or better than solder. After we had run new bearings and removed the clay plugs from the cylinder we assembled the engine and she started off all right. However, we found that the back pressure

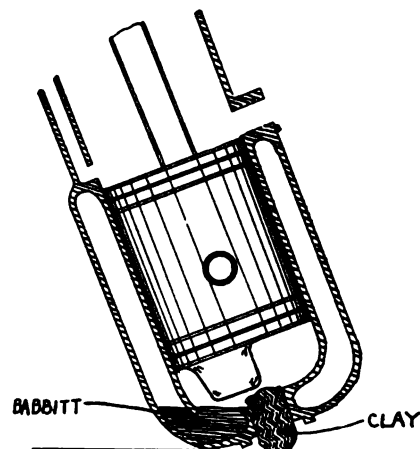


FIG. 3—HOW THE BROKEN CYLINDER WAS REPAIRED

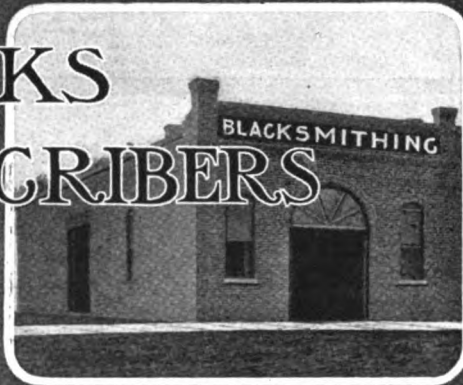
from a clogged muffler cut down the power of the engine, so I got under the car and cut a $\frac{3}{4}$ -inch gap in the exhaust pipe. This was not good practice, but the parties were in too great a hurry to have a "cut-out" put on in the regular way, so I took the shortest way to do it.

The owner of the car and his wife had ridden thirty miles over mountains without giving the engine any oil; they had forgotten to turn on the oil or to watch the indicator to see how the oil was feeding. They had stopped for repairs at every garage along the line. The last man to fix them up had hammered a piece of babbitt into shape and put it in as a wrist-pin bearing. It did not fit, became loose, doubled up and caused the piston to strike the gate stub. Owing to the repeated repairing it took three days and three nights to run a little over 100 miles at a repair expense of \$65.00. These people had practically worn out a pretty good engine. After we fixed up the car they made the remaining 45 miles over three mountains in two hours.

These jobs were, of course, emergency repairs and they should be considered as taking the place of permanent and more substantial work but temporarily. Work of this kind pays well if done well.



TIMELY TALKS WITH OUR SUBSCRIBERS



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Putting It Into Practice

It is one thing to read about a good stunt, a good idea, a good method, but it is another matter entirely to put it into practice. For example, a man may read all about the new smith-shop equipment, modern forges, blowers, power hammers and things—may read about them until he gets a headache, but if he doesn't invest in them, his reading and headache will do him no good.

Just so, a man may read all about the very nice and very desirable things we continually talk about in these columns, in the way of business methods, accounting, and so forth, but if that man doesn't try to put some of those suggestions into practice, he'll never get anywhere.

Mr. Athy of Ohio is getting full value out of "Our Journal." We know he is, because this is what he says: "I consider it a privilege to get a paper like THE AMERICAN BLACKSMITH every month, and I am endeavoring to put into practice the various pointers and the information it contains."

Now, Mr. Man, just try to put into practice half of the pointers given you in this issue; and then tell your neighbor. You'll find more sound, practical helps in this issue than you can yourself pick up in a whole year. Read—and Put It Into Practice.

Next Month

The June issue will be a vehicle number. If you are a vehicle man, and want some real live vehicle information, be sure to read the June issue. There'll be information on both horse and motor vehicles, and if you want to keep up with the times you will necessarily need to read that June paper. Don't fail to read it, digest it and then to put it into practice. Tell your neighbor.

Subscription Agents

When a stranger solicits your subscription to THE AMERICAN BLACKSMITH, or any other publication, insist upon his showing you absolute proof that he is an agent in good standing and is employed by the publication which he represents. Don't, under any circumstances, give the man your money if you are not sure that he really works for the paper he says he does. No matter what the man offers you—no matter what price he makes—no matter what premium he promises to send—DON'T GIVE HIM YOUR MONEY IF YOU ARE NOT SURE.

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Friends

"A friend," says Webster's Big Book, "is a person who wishes us well." Have you any friends in the craft? Do you know any smiths whom you wish well? Of course you do. You wish them all well, whether you know them or not. So, then, just read this little notice and act accordingly:

Have you a friend whom you desire to read some special item or article appearing in "Our Journal"? If so, send in names and addresses and we'll send copies free, marking the special item, if you desire. Just tell us the title of the article—we'll do the rest. Perhaps some article on price-cutting will just hit that price-cutting brother. Perhaps an article on costs will just strike another correctly. Bear that suggestion in mind and—Put It Into Practice.

Are Our Advertising Pages Complete?

Is there anything not advertised in "Our Journal" that should be? We want the advertising pages of "Our Journal" to be a complete blacksmith catalog and reference. And to make it so we want your co-operation. We want you to tell us if there are any tools, machines or items of equipment not advertised in these pages that ought to be. Are you using anything in your business that is meeting your approval, that is not announced in our advertising section? If you are, just tell us about it. You'll help us, you'll help the maker of the article and you'll help your brother craftsmen. Just look about your shop and tell us what you include in your equipment that isn't advertised in "Our Journal." Observe and—Put It Into Practice.

That Shop Number

Did you ever have your shop photographed? Now is a good time. And if you have the kind of a shop we know you want to have, send us one of the pictures and we'll get it into "Our Journal," where your brother craftsmen can see it and know what kind of place you are working in. We want brick shops, cement shops, wooden structures and all kinds. We want exteriors, interiors and floor plans. We want pictures of machines, pictures of departments, pictures of the work force. In short, we can use any picture of any shop that has anything worth while to show. And the sooner we get your pictures the better we'll like it. If you haven't a photograph, a floor plan will be just the thing. Do it now.



THE BLACKSMITH

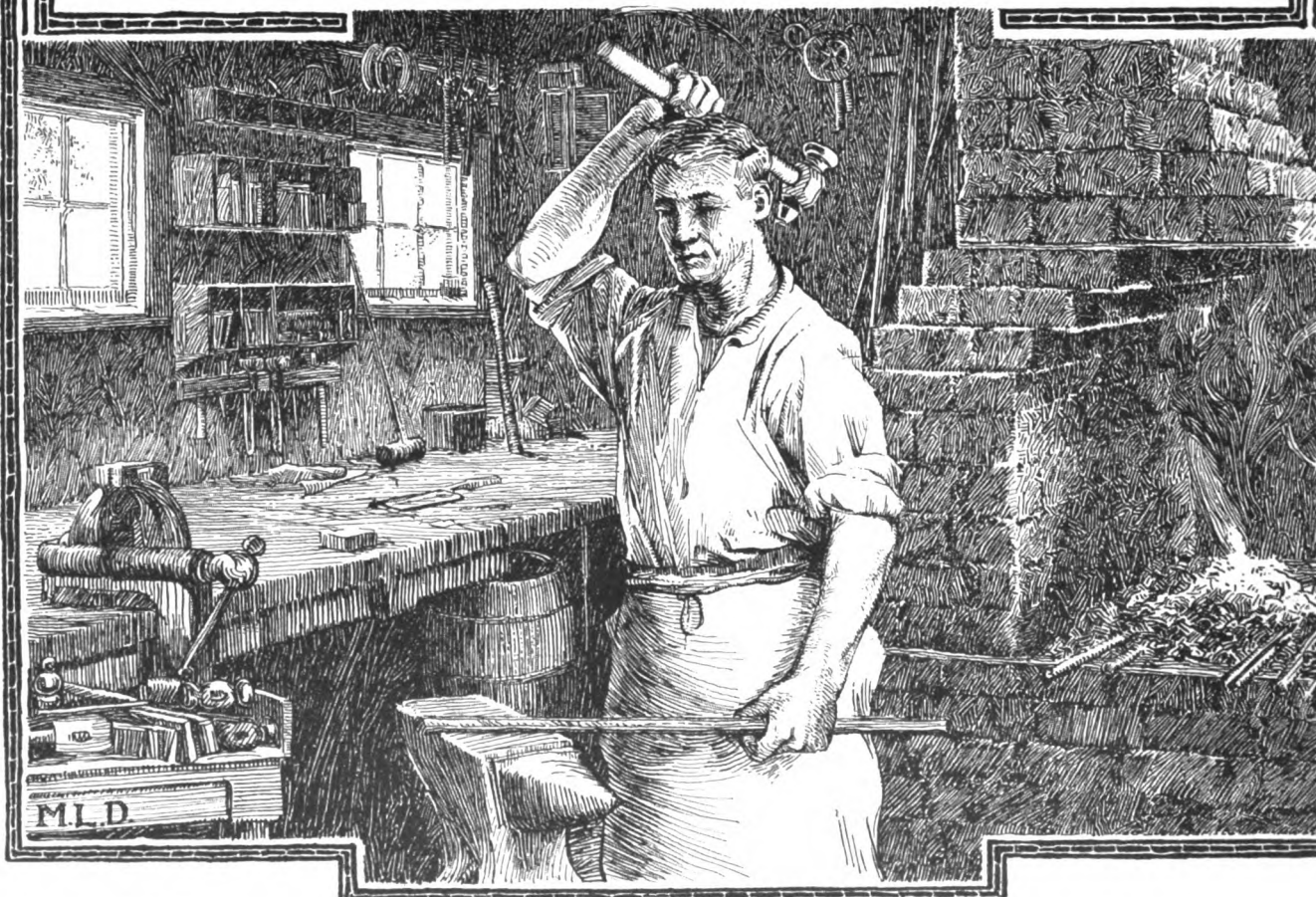
UPON the threshold of the forge he stands as an apostle of toil; a fine big fellow, with powerful shoulders and a mighty chest, and with arms whose bulging muscles swell and play in the red glow of the fire. At the will of their master, the bellows wake with a roar from a contented slumber.

In God's great out-of-doors, the sky may be clouded, but the flaming forge wakes within him a sense of contentment. The human voice in song captivates, but to his ear there is no sweeter sound than the music of the anvil, as the heavy hammer obeys his commands. For many, the theater is a retreat from the world's cruel realities, but to the blacksmith there is no greater drama than "the play" of the sparks, nor no more sublime tragedy than the death and resurrection of the fire.

Face to face with burning, blistering heat, his daily work is done. The constant echo from the anvil is: "One sledge blow never shapes the iron." He teaches, by repeated effort, that tasks are seldom accomplished by a single attempt—it is the masterful stroke of persistency that achieves a purpose. Beneath his dirt-stained visage is hidden the real man; a man with a great heart, who is touched with pity at all human misfortune, and whose hand-grip stamps him a loyal friend and a brother to the rest of mankind.

Gracious in the gloom, cheerful in the sunshine, he inspires hopefulness; gives to labor, dignity; and is distinct as an exponent of optimism.

Louis Varnum Woulfe





Figuring On a Profit and Getting It

W. O. B.

A GENERAL smith in a prosperous Ohio town was doing a good business that was keeping himself and two sons busy. But he couldn't understand why his bank book did not show a bigger balance at the year's end. "Why doesn't my bank book show the profit I figure on?" asked this smith. "When a job comes in, I figure my costs, add a profit and charge accordingly."

Investigation disclosed the fact that this smith employed himself and two sons—boys of eighteen and twenty—but allowed nothing for salaries. "I give them their clothes, keep and spending money," explained this smith, "but I would do that any way, whether or not they worked for me—so why burden the business with that?"

Further questioning brought out a number of other mistaken ideas regarding business and profit-making which, summarized, showed just why he never got the profit he figured on.

This smith and his two sons ran the business. There was no allowance made for salaries; and while salary expense was not figured, it was an expense just the same. It came out of the business. And when proper allowance was made for salaries and several other items, such as rent (the smith owned the shop, so didn't think rent should be figured), interest on the investment, and depreciation, it was found that this smith was fairly breaking even, and on some jobs where competition was sharp he actually sustained a loss.

The question of whether or not any certain item should be figured as an expense, must be solved by the question of whether or not it is a real business expense—if it is costing anything. If it is an expense, whether or not you figure it as such, it must be paid for, and that too before a cent of profit comes out of the business.

Take, for example, a job of shoeing.

In the accompanying chart the selling price—the money you get for the work—is represented by a perfect square. Out of this square must come the cost of the stock used in doing the work and also the overhead cost, or the cost of doing business. These two make the full cost, and after the full cost is taken out of that square representing the selling price, we have a little sliver left which is

known as profit. The proportions for this chart are based upon a sixty-five per cent overhead cost, with shoeing at \$1.70.

Of course, that Ohio smith could figure a big profit on paper, but he never made it, never saw it, never actually laid his fingers on it, because he did not figure all of his expenses.

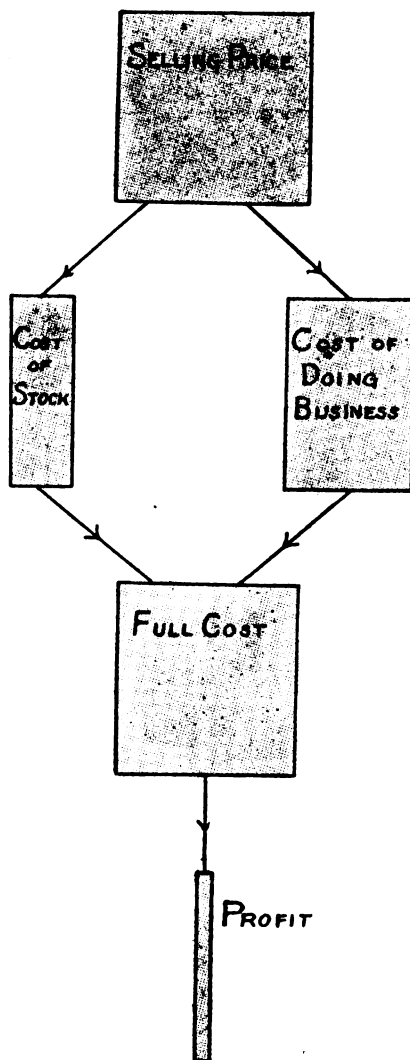
Suppose, for example, we did not figure any expense at all; would the mere matter of not figuring any cost make the \$1.70, that we get for shoeing, all profit?

If we swallowed a big dose of poison, would the fact that we did not *think* it would kill us help us very much?

A smith may fool himself into thinking he is making a big profit, by failing to charge all his expenses and costs into the business, but the fact that they come out of the business before his net profit, makes the difference between paper profits and actual profits.

Take, for example, a wagon jack. Suppose you were selling them—selling a good jack at \$3.00. They cost you, say \$2.00. After you pay \$2.00 for a jack you haven't any more \$2.00—all you have is a wagon jack. When you sell it for \$3.00, you have no more jack nor \$2.00, but \$3.00; and everything concerning the transaction comes out of that \$3.00. Your profit comes out of the \$3.00. If you do not sell the jack, there is no profit, no matter if you only pay ten cents for the jack; and your profit comes out of that \$3.00 only *after* your costs have been taken out of it. Even suppose you painted the jack to make it sell, and didn't figure on the cost of the paint, that cost would also come out of the \$3.00 before your profit.

Profit is that sum left over after all expenses and costs have been deducted from the selling price; and whether you figure on paper correctly or not, your real money profits or



WE HAVE A LITTLE SLIVER LEFT
CALLED PROFIT

the lack of them will show nothing more nor less than what you really and truly make them.

And when it comes to a basis on which to figure your percentages, there should be no argument needed when once the idea is thoroughly understood that everything comes out of the selling price. Nothing can come out of the cost. You don't make your profit out of the cost. The profit is part of the selling price.

The Duplicate Slip System for the Smith

B. E. WISER

"How can I handle both my credit and my cash business in the most profitable manner? In other words, how can I handle my cash customers so effectively and accurately that a constantly increasing number will want to trade with me? How can I also handle my charge customers efficiently so that the long-time credits will be cut out?" That is the real problem, the real question for every smith to decide—and decide quickly.

I decided it all right, but not so quickly as I wished. I wanted a method that would take care of my cash and credit and be a complete shop system—with the further stipulation that it be quick and require little expense. Like many other smiths, the idea of keeping books is abhorrent to me. I admit that. I may be a good horseshoer or a fine repairman, but I am not a good book-keeper, and the thought of keeping a day book, a ledger and an invoice system was positively disheartening. You can readily see, then, combining these objections, why it took me some time to actually devise, install and try out a plan that would satisfy me. I do not contend that it will satisfy every one and meet all conditions. I am always open for improvement, and THE AMERICAN BLACKSMITH has certainly aided me in this respect and also in helping me devise my system. If any brother smiths can improve this system I will be very glad to hear from them.

I started this article by giving the cash-and-credit question as the real problem for every shop owner. That is *the* perplexing problem, but before it can be considered, the management of the shop itself must have due deliberation—and sufficient care. An

accurate credit system would be of little value in a shop run on slipshod methods. I must confess that my own shop was not run right until I installed the present system; but this was largely the result of shifting from one method to another, each one having some glaring fault or gaping omission, or some drawback which caused it to be discarded. Of course, no strict tally could be kept on the business, and my trade suffered accordingly.

However, after devising my present

voices and receipted bills from manufacturers and jobbers for material in my shop. Then I got a number of cards, 4½ by 6 inches, ruled as shown in Fig. 1. I took an inventory of my whole shop in this way: As I came to each article I determined the cost as best I could from the bills. Then at the same time I figured out a selling price. (I also noted down just the cost of stock in a book, so as to figure up the money I had invested.) In figuring the selling price, I made a chart:

A	B	C	D	E	F	G	H	I	J	K
5%	10%	15%	20%	25%	30%	33%	50%	62%	75%	100%

THE LETTERS ON THIS CHART INDICATE THE PROFIT TO BE MADE, BASED ON THE SELLING PRICE

system, I determined to know to a certainty just what I was doing when I made the price on any article or job. First I hauled out all the in-

Then taking \$1.30 (for instance), the cost of the smallest set of cupped oak hubs, I wanted to make 33% on them (exclusive of the time

HUBS			
SIZE	AMOUNT	USED	PRICE
Cupped Oak —			
7x8x9	3 sets	1	G-\$2.00
7x9x10	4 "		F- 2.15
8x9x10			
8x10x11	2		F-2.65
9x10x11	1		F- 2.75
9x11x12	3	x2	F-2.85
10x12x13			
11x13x14	2		G-6.75
12x14x15			
Plain End Oak —			
10x14	1		E-4.40
11x14	5	x34	F-6.00
11x15	3		F-6.45
11x16			
12x16	2	1	G-8.60
12x17	1		F- 9.00
13x18			

FIG. 1—STOCK AND INVENTORY CARD GIVES FULL PARTICULARS



consumed in putting them in). Accordingly I figured:

100%=selling price
33%=profit

67%=\$1.30, the cost

$1\% = \frac{1.30}{.67}$ or

.02 (approximately)

100%=\$2.00, the selling price

Having arrived at the selling price, I tagged the set of hubs and marked it $\frac{G}{100}$. The "G," you will notice by referring to the chart, shows that I am making 33% profit on them. (These letters can be changed around, making it a private code.) The advantage lies in knowing just what you are doing, to a certainty. If a particular friend of yours wants a reduction, you can knock off 10 or 15% and still

manner and then invoiced them on the cards as shown in Figure 1. This I continued on all articles, tagging and labeling and figuring out selling prices, marking each with the letter corresponding to its profit clearance, then invoicing on the cards.

Articles like calks I marked for single prices; that is, the profit (the letter) and selling price for one calk was marked on the box. Horseshoes I graded into the different makes, marked their prices and put a tag on the rafter over each kind that could be read from the floor. I added a couple of other numbers on this tag and left off the decimal point—this to confuse anyone who might be too inquisitive. The advantage in this tagging is that I or my helpers know just which shoe or calk or whatever

This process of inventory I continued throughout the shop, and what an eye-opener it was! I never exactly knew, before, what a multitude of unnecessary material had accumulated, and how badly I needed new, up-to-date stuff. The knowledge gained from this inventory caused me to redouble my efforts and put new enthusiasm in me.

After finishing my inventory and pricing my stock, another question arose in my mind: Do my prices give me a living?—am I making enough? I had previously decided on about 18% as the cost of my doing business and had marked my prices accordingly. But I did not know—and I wanted to know to a certainty—so I made up an expense form and filled it out monthly.

Rent of building (if you own, state what it would rent for)	\$
Helpers' salary per month	
Taxes (divide annual tax by 12)	
Insurance (divide annual premium by 12)	
Lighting and heating per month	
Advertising	
Presents, donations, etc.	
Printing, stationery, supplies	
Coal (smithing)	
Telephone per month	
Bad accounts, average per month (watch this column carefully)	
Salary for yourself (put down what you could earn outside)	
Interest on investment (say \$2,000 at 6%—\$120 per year \$10 per month)	
Depreciation of stock, values, shrinkage	
Miscellaneous	

Total expense per month \$

The average percentage of expense is found by multiplying the cost of operation (total expense for the month) by 100% and dividing this by the same amount of the total sales for the same period. In the foregoing list there are some items that may be bothersome. The lighting and heating are distinct from the smithing coal. The "bad accounts" item can only be roughly estimated until you have inaugurated the forthcoming system. The "interest on investment" means the interest your money would earn if, instead of being invested in the shop, it were in a bank; that is, its natural earning power. The inventory

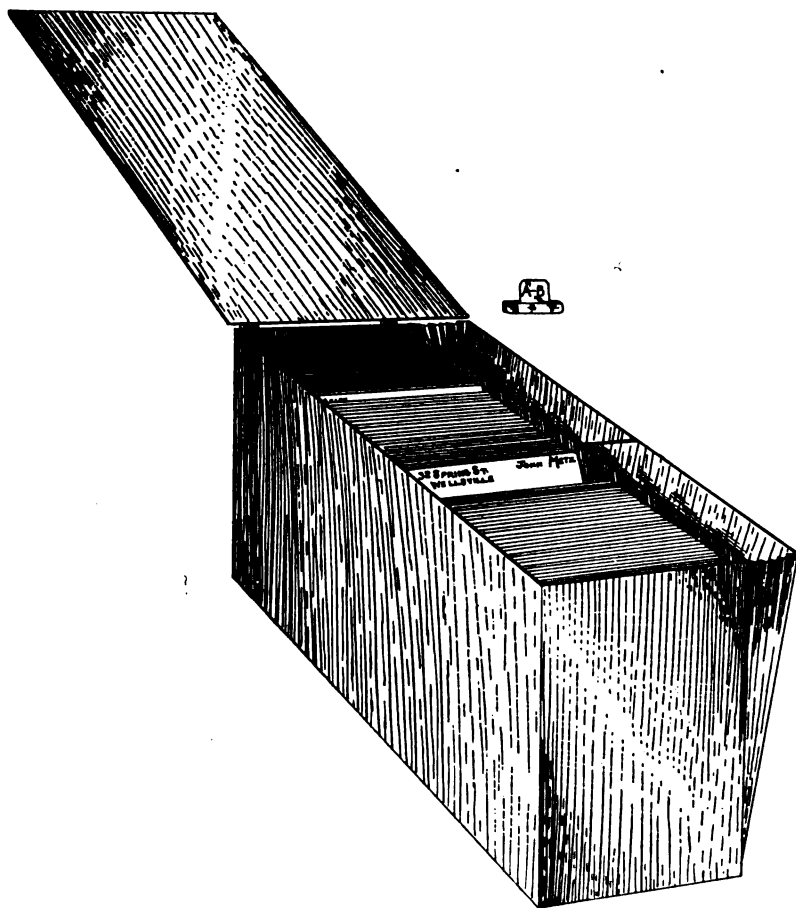


FIG. 2—BOX TO HOLD ACCOUNT SLIPS, STOCK CARDS AND BILLS PAYABLE

know exactly what you are making. Or if it is marked too close, you can tell him the price is low and won't allow any discount. What a difference from saying, "Oh, I guess you can have it for \$1.25"—and not knowing whether you are making a loss or a profit.

I marked each set of hubs in this

it is to push the hardest when a customer is in doubt. You also know your exact profit. Of course, hubs, axles, horseshoes, etc., are not sold outright, but by marking each with a definite profit and then adding your time to this cost you are more apt to have an accurate profit gauge. But more of this later.

gives the amount invested in stock—
of the rest of the money invested,
you are the only one that knows.

Having started the shop on a right basis, we now look to the business end; that is, the handling of cash and credit. The first requisite is a box about 7 inches high, $4\frac{1}{2}$ inches wide (inside measurements) and at least 12 inches long, as shown in Figure 2. (Page 187.) On the side of this is a hinged pocket for bills payable. This is made by carefully gluing or tacking a board with cloth, allowing a surplus of cloth in the sides. It is held closed by the catch in the depression. The cover extends over the top of this pocket.

Next, I got some sales books printed, as shown in Figure 3. These slips, that are bound into booklets, are printed in duplicate; i. e., there are two slips of the same number attached to each other at the bottom of a perforated line; the duplicate or under check being bound. A one-side carbon is on top of the book, its reproducing side down (such as are seen in grocery stores, department stores, etc.). The duplicate check is generally printed in another color than the original, to distinguish the two. The size of the check is 4 by 6 inches and the book contains 24 originals—or 48 slips in all (you can get any number). The manufacturers generally furnish a leather cover in which these sales books are held at the top by a clamp. Inside of the top cover there is a space with openings at either end to receive a card. In this is placed the index sheet shown at Figure 4. The numbers on this index correspond with those of the checks.

The last thing necessary is envelopes large enough to fit the sales checks and small enough to fit comfortably in the box. We are now ready for business.

The first operation is to place the invoice cards in the back of box in alphabetical order. Guides, illustrated by A-B in Figure 2, can be used if this list is large. The batch of invoice cards is shown in the engraving, beginning with "Axles." Next, we make out an envelope for each customer and transfer his present credit account to a slip of paper inside the envelope. They are arranged in alphabetical order and guides used if desired. The bills payable are placed

in "payable" order in the pocket at the side.

Next morning, we place a sales book in the leather cover, insert an index, and we are ready.

Mr. Jones comes in and orders some work done. This is neither cash nor credit *yet*—so we pass on. A little later, Jake Murphy comes in and takes away his buggy. Before he goes, however, we take out our sales book, pull No. 1 check from underneath the carbon to the top and proceed to bill him; one axle so much, time, so much; then we go to the file (our newly-completed list) and look up his account; if he has any we mark it down in the "Account Forwarded" space and add it in with the rest; if not, we sum up the itemized amount, fill out his name,

address and date in the proper space, and hand him the carbon copy—we keep the original. Then we put his name—address if necessary—opposite No. 1 on the index slip and place the amount of his order in the credit column. The sales check we place on a spindle. Smither has come in, meanwhile, and wants his horse shod. When the work is finished, he hauls out his “long green” and graciously inquires the price. If we have a set price for shoeing, we simply bill horseshoeing so much on our sales book; if he has special shoes or calks, we itemize it. Before filling the name-and-address space, we go to the file and see whether he has an account. If he has we mark it in the “Account Forwarded,” add it with the rest and fill out his name and address.

[illegible]

FIG. 3—THE ACCOUNT SLIP IS WRITTEN IN DUPLICATE



Then, if he pays, we mark it "Paid," with our initials and hand him his receipt. We place his name after No. 2 on the index and the amount he paid in the cash column. If he has no account we simply mark "Cash" across the name-and-address space, put down "horseshoeing" opposite No. 2 on the index and the amount in the cash column. The original sales check we keep on a spindle.

Old man Painter, after hanging around the shop, finally decides to pay his long-standing bill. We immediately rush to the file and, taking the slip from the envelope, mark the amount in the "Account Forwarded" on the sales check, fill in his name and address, get his money and hand him his receipt. After No. 3 on the index we place his name, and the amount in the cash column. This is continued during the day.

In the evening we add the cash and credit columns and place the sums in the "day total" column under their respective headings. This eliminates the necessity of using a new index sheet for each day's business—the date being placed over the totals for that day. When a sheet is used—sometimes one is used in a day—we proceed with the system.

Taking the sales checks from the spindle, we check them off with the inventory cards. That is, in taking care of sales check No. 1, we go through the inventory cards, and when we reach "Axles" we check off the axle that has been sold, at the same time noticing whether we need more, whether there has been much demand for them and whether we received the right price. If there are more items on this bill for material we check them off on the inventory cards, and notice how the supply runs. This process is repeated with all checks itemized with material.

Next we sort the "credit" and "bills paid" checks, alphabetically, and the "cash" checks in separate piles. The "credit" checks we place in their proper envelopes, and if there is any previous account it is added in, bringing it right up to date. The accounts of the "bills paid" check we take out of the envelope—leaving it blank—and lay them aside to keep three or four months for any emergency or dispute that may arise.

The cash is reckoned up, of course, at the end of each day. The total of the whole index sheet is added on the

back, also the date it covers. This total is carried on to the next index sheet, where in turn it is added to the total of that sheet. Continuing this, sheet by sheet, we have at the end of the month a total of the exact cash and credit business. These two totals should not be confused, as their sum is not the sum total of the business done. They bear no relation, except that if the credit total exceeds the cash total, you can be sure that your debtors are resting on their oars.

Here's how I eliminate my "stickers"—you will notice on my sales check the phrase, "All bills due on month billed." I have this printed on my monthly statements in larger letters than on this check. Then, in going over my file at the end of the month, if I find that a man has not paid who has been billed, I send him another the next month with a hand pointing to this phrase, stamped on

	(Name)	(Cash)	(Credit)	(Day Total)
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				

FIG. 4—THE INDEX CARD TAKES CARE OF TOTALS

the bill. Then, for the third month, if he has not paid, I write him a letter. If he still hangs on, I make it a point to see him personally on the fourth month. In this way I am building up quite a reputation and a good business at the same time.

The efficiency of this system is readily realized in that the laborious task of making a monthly itemized statement is eliminated; the day book, ledger and cash book are done away with, besides the separate invoice system. The customer has

itemized accounts that he can compare with his monthly statement and disputes can hardly arise. The system holds good whether you run the shop yourself or whether you have a number of employees. In that event it would be necessary to use an index each day and have a book for each man. This, however, consumes time, and I think it is better to have one man tend to that end of the business. I have used this system for some time now and it has been a revelation to me to see how I could cut down expenses, buy judiciously and increase my patronage by keeping a strict tab on the wants of my trade and knowing to a certainty just what I am doing.

Collecting for Small Jobs

By THORNTON

Perhaps the worst evil in the general smithing business, and the hole into which a great deal of profit slips, is the small, petty-account abuse; and by this I mean the many little accounts that require more time in collecting, sometimes, than they are worth. Farmer Brown comes in, for example, with a little twenty-five or thirty-cent job. "Charge it," he says, and straightway you think: "Oh, it's too much trouble to charge a little thing like that,"—and so you let him have it.

Now, I suggest taking care of these little things in this way. Get a common ordinary counter or day book and hang it where it will be handy always—at the forge, bench or where ever you want it most. When a little job is charged, jot it down in the book. If the customer has a regular account, add that little job to it when you post your books or make out bills at the month's end. If some of the little charges are not for regular account customers, make out memorandums on bill heads, or a good way is to jot it down in a little pocket memorandum book.

Then, keep the memo. book in your pocket. When occasion presents, just remind your small-job customer of the thirty or forty-cent job you did. If the customer is in business—a grocer, butcher or hardware merchant—just drop in some day when passing and get something you want or need, and thus square up the account. If he's a farmer, you can get eggs or butter or potatoes to even up



matters; and when these small-job folks see you mean business they will respect you for it. Don't allow any false ideas on the matter of the smallness of the charge to interfere with your getting what is coming to you. Of course, don't go to the other extreme and waste more energy and

HORSESHOEING at Bargain Prices GO TO Burke's Shop

He will shoe your horses at
less than half price.

80c for four new shoes
40c for resetting

DONALD MACPHERSON
"The Quality Shoer"
3rd Street, Battleford

**THIS WAS "MAC'S" FIRST SHOT
INTO HIS COMPETITOR'S RANKS**

time on a little bill than the charge is worth.

And if you put this idea into practice—if you make use of the small-charge book suggested—you'll find that these little jobs amount to quite a considerable sum in a month. This will show you that you cannot afford to let the little jobs go uncharged and unpaid for.

The suggestions made for collecting, are but a few of the innumerable ways in which you can get your money. Keep your eyes open, observe your trade and let your ears hear all they can about your customers, and you'll never lack for means by which to collect for small jobs.

How MacPherson Met Competition in Battleford

MacPherson was a hard-headed Scotchman who stuck to the horse-shoeing business because his father before him and his father's fathers as far as he could trace had done the same thing. And so "Mac," as he was familiarly called by his customers, was not only a horseshoer but a very good one, with the "smell o' forge an' fut born right in him," as Mac would say.

His business was built upon quality, and woe betide the man who spoke of competitors' prices when Mac was around. "Dinna y' lik' th' price?—Weel then, gang about y' way—y' kenna lik' gude work," was the way Mac put it.

And so his competitors got to cutting prices in an attempt to get his business, which was naturally quality custom trade, away from him. They saw with envious eyes that the hard-headed Scot was not only getting good trade but he was getting good prices, too. And while MacPherson had always charged a "wee better price" than his competitors, they now began to cut their already lower figures, until little or nothing remained of their narrow-profit margin.

The price MacPherson got for his shoeing was fifty cents, or two dollars a set, with resetting at thirty, or one-twenty a set—or in the language of the trade, 30—50. The other smiths in town were getting 20—40 regularly, but now they cut to 15—30, as the opening gun of their campaign.

When advised of this move on the part of his competitors, MacPherson merely shook his head. When asked if he intended to make a corresponding cut in his prices he said, firmly but kindly, "I am not, laddie. Don MacPherson wul be getting 30—50 when th' rest o' th' shoers air enter-tainin' th' sheriff."

When Burke, Klein, O'Connor and Muggins heard of this they gritted their teeth and cut to 10—20, and had the satisfaction of seeing some of MacPherson's customers coming their way.

Mac saw them, too, but his smile was broader than ever. When questioned regarding the prices of his competitors he merely said: "Y' dinna be wantin' vera gude work, if y' gang t' th' cheap shops. Pay my price an' I'll da th' work."

The day after MacPherson heard of the 10—20 price of his competitors he wrote advertisement No. 1 which he published in both papers of which Battleford boasted.

After the appearance of the advertisement, Battleford folks began wondering. First wondering if MacPherson were crazy and then just what he was "driving at." When they called at his shop for an explanation he told them with his usual Scotch frankness that he thought it no more than fair, honest and square to let his customers

know that Burke was doing work at a great deal less than he could afford to do it. And anyone who wanted work like Burke's would be foolish, to say the least, to pay any more than Burke was willing to take for it. And so certain horse-owners flocked to Burke's.

When Klein saw how Burke was gaining on him through the advertisement published by MacPherson he rose in his wrath and cut his price to 10—15. And the day after MacPherson learned of this advertisement No. 2 appeared.

The appearance of this caused friction in the ranks of MacPherson's competitors, and they now began a price-slashing war in earnest. O'Connor cut below Klein and then Muggins cut under O'Connor and so the war kept up until the price got down to 5—10, with a free shoeing to every fifth customer. This last offering was a master stroke by O'Connor and when it was made he, of course, never thought of ever delivering that free shoeing unless demand for it was made. But he reckoned without MacPherson. That worthy was seated across the street from O'Connor's shop in the window of his friend Lawyer MacGregor's office, and with a telephone at his elbow he kept various town merchants advised when they could get a shoeing free.

Still Greater Bargain in HORSESHOEING at Klein's Shop

Now doing work for less
than Burke.

60c for four new shoes
40c for resetting

DONALD MACPHERSON
"The Quality Shoer"
3rd Street, Battleford

**NO. 2 WAS AN ADVERTISEMENT
FOR COMPETITOR KLEIN**

And so matters kept up for several weeks, the bargain-hunting crowds going to one or the other of Battleford's shops, whichever quoted the lowest price. In the meantime business fell away rapidly at MacPherson's. The occasional job of shoeing



which he was called upon to do was for a horse fancier, a rich resident or to shoe the special driving horse of the grocer or butcher. Farmers from the surrounding territory all went to the price-cutting shops, and the work horses of merchants and others were taken to the same places.

But MacPherson wasn't kicking. The occasional shoeing jobs he did get were at his own price, and every time he did a job he knew that a certain proportion of the price he got was good solid profit, which was more than his competitors could say.

When shoe sizes and stock were getting low in the shops of his competitors, MacPherson offered them the freedom of his stock. Anything in his shop was offered them for cash at ten per cent above cost. Of course they weren't inclined to buy. They were content to write to jobbers and await the arrival of new stock, though O'Connor was sorely in need of some sizes. Finally he approached MacPherson, offering to buy such shoes as he needed until a new lot arrived. The day after O'Connor got his first set of shoes from MacPherson announcement No. 3 appeared in MacPherson's usual space.

This was just the opportunity MacPherson was waiting for. Folks read the announcement, stared, re-read it and then went to MacPherson's to ask questions. And to all he gave the same answer: "I dinna tell nothink but the truth. Laddie O'Connor canna say different. Ask the mon hi'sel'. An' then, too, lad, ask the gude mon how he makes his profits." And some did as MacPherson suggested, only to be met with a volley of abuse, aimed principally at the head of the Scot.

No man likes to feel that he is being made the laughing stock of the community, and the continual prodding of MacPherson soon brought the competitors to their senses, especially so when they found that the people who had any real regard for their horses seldom brought them in a second time. These folks generally admired the stand taken by MacPherson, and while some remarked about paying over double the cut price for shoeing, they usually admitted before MacPherson got through talking that it was better to pay more for something that was worth more than to pay less than half price for work that

was worthless and really injurious to the horse.

MacPherson now has his competitors "eating out of his hand." And when any one of them thinks of doing any price-cutting he usually happens around MacPherson's way to see if

HORSESHOER O'CONNOR

A BUSINESS WIZARD

He bought four shoes from me for forty cents, shod Grocer Burrell's horse and charged him forty cents for the job. How does he do it? Calks, nails, coal and time are worth something.

ASK O'CONNOR

DONALD MACPHERSON

"The Quality Shoer"

3rd Street, Battleford

NO. 3 WAS THE SIGNAL FOR THE
SURRENDER OF HIS
COMPETITORS

that hard-headed Scot is still in his usual good health and "on the job." For as long as MacPherson keeps his usually keen wit and good health, shoeing prices are not likely to drop in Battleford.

Paying for What You Don't Get

A. M. BURROUGHS

A drummer, walking into a smith shop in the corn belt, found the proprietor back in the shop, rescuing nuts and bolts from the scrap pile.

After watching the work for a few minutes the drummer interrupted him:

"There's a chance for a man to get a good place as manager of a big shop down the State," he began. "It's owned by a stock company. At present they're without a foreman.

"The position will pay \$150 a month to the right man. I'd like to find some hustling fellow I could put them in touch with. They're good customers of the house."

"Say, that looks good to me!" the smith returned. "You know I've found it pretty hard here, for lack of capital. I wouldn't mind making a change if I could get a place like that."

"Do you consider yourself a \$150 man?" the drummer asked, with a twinkle in his eye.

"I certainly do!"

"Well, you wouldn't do at all. That company wouldn't stand for a foreman who spends his time picking bolts out of old buggies and wagons while a ten-dollar helper is trying to please a cranky customer."

The drummer may have been only joshing about the \$150 job, to teach the smith a lesson, but the story has a point just the same.

Can a \$40 a month helper run a business as well as a \$150 proprietor?

Of course not. When the business is being run by a \$40 man it is a \$40 business. When it is run by a \$150 man it is a \$150 business.

That is the difference. A \$150 man can sell and do more. He will drive away less regular custom. He can convert more of the transient custom into regular custom.

One new customer added to a shop's regular patronage every day, means an increase in gross business which at the end of a year would amount to a very good figure.

Five per cent net profit on that volume of business will buy an automobile.

Utilizing the Waste Heat of a Small Gas Engine

[Editor's Note:—Every gas-engine user will be interested in this story of how the waste heat of an eight-horsepower engine was put to work. It contains a suggestion for the owner of the power shop. Even the smaller shop engines can be so piped as to keep the shop supplied with hot water, while the ejector idea for the exhaust can be used to assist in the ventilation of the shop. We are indebted to Power for this article.]

In most small gas-engine installations no attempt is made to recover the heat carried off by the exhaust and jacket water. As this available heat amounts to about 68 per cent of the total heat supplied to the engine, using this heat wherever possible will effect a great saving.

The factory of the Sanitary Water Still Company, Jamaica, L. I., furnishes a good illustration of this statement. Both exhaust and jacket water are used for heating, with a resultant saving of about \$300 a year. The illustrations represent the old and usual layout and the change that effected the saving. This plant has been in operation for about six months and gives entire satisfaction. The engine is a horizontal, 6½ x 12 inch, running at 300 R. P. M., operates on illuminating gas and is rated at 8 H. P. It is belted to the shop shafting and has averaged 48 hours per week for the past three years.



Fig. 1 shows the original installation. The gas was fed to the engine through the usual gas bag, and the muffler was of the baffle-plate type, fastened to the end of the exhaust pipe. A 24 x 82-inch cooling tank, holding about 160 gallons, was set at the engine level and piped on the thermo-siphon principle. Due to the low head, however, the circulation was very sluggish.

The first step to improve the old installation was to dispense with the gas bag with its leaks and yearly renewal. An old hot-water tank about ten times the working volume of the engine cylinder was put in the gas line, as shown in Fig. 2. The gas is discharged near the bottom and the engine draws its supply from the top. With this arrangement no pulsation of the gas supply is noticeable and leaks and consequent expenses are eliminated.

The engine exhaust is piped to the drying closet on the second floor, which contains two racks, each made up of six 1-inch pipes, 42 inches long. The exhaust passes simultaneously through both racks on its way to the muffler. The temperature of the lower rack averages 140° F., and the upper 120°, which keeps the temperature of the drying closet at about 100°.

A 20-gallon hot-water tank serves as the muffler. The open drain, which takes care of the condensation in the exhaust gas, is placed high enough to

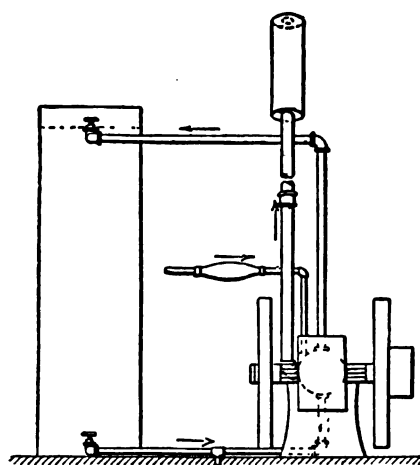


FIG. 1—THE GAS ENGINE AS CONNECTED ORIGINALLY

maintain about 1½ inches of water in the muffler. This assists in muffling the noise of the exhaust. The discharge pipe from the drying racks is carried up in the muffler, to prevent

the water from flowing back to the engine. The pipe is capped and partly cut away, as shown, which directs the exhaust against the side of the muffler and breaks up the issuing gas, the temperature of which drops to about 70 degrees.

As all the useful heat of the exhaust is given off in the drying closet, there remains only the velocity of the escaping gas that can be converted into work. This is done by means of the exhauster shown in detail in Fig. 3. This acts as an ejector, and being placed directly over the buffing lathes, draws out all dust and dirt that escapes the exhaust blower. The exhauster consists of a piece of 2½-inch pipe, passing through the roof, which carries a cone made of sheet iron at the end inside of the building. The exhaust discharges into this pipe through the ejector nozzle at the end of the exhaust pipe, carrying along the dust drawn in through the annular opening between the nozzle and the pipe. To get a steady flow of gas, the pipe from the muffler is reduced from 2 to 1¼ inch, as only practically cold gas passes through this pipe. The reduction does not help much, however; the discharge being intermittent.

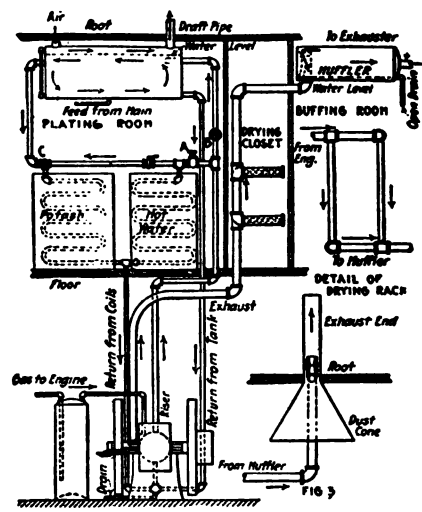
The jacket water is used to heat potash in a 24 x 18 x 30 inch tank, and water in an 18 x 18 x 30 inch tank. These tanks are not always in use, and provision had to be made to take care of the cooling water in some other way. Space being limited, a 19 x 50 inch tank was hung to the rafters and piped as shown. With three-way cock C and valve A closed and valve B open, the heated water from the engine rises and is discharged into the top of the tank. There it circulates and is cooled by a counter current of air passing over the surface of the water. This current is reduced by a 2-inch draft pipe, extending 6 feet over the roof, the pipe acting as a chimney. The air is drawn rapidly through the 2-inch hole on top of the opposite end of the tank, removes the vapor as it rises and carries it along through the draft pipe to the atmosphere. The cooled water returns to the bottom of the cylinder, performs its work and rises to the tank again. The circulation is rapid, as shown by the temperature of the water, leaving the cylinder at 180°. A gauge glass on the tank indicates the water level at all times.

That this method of cooling is very effective is proved by the difference in tank capacity for the same work. This tank, holding about 50 gallons, does the same work as the old tank of 160 gallons' capacity. The manufacturer's specification calls for a 300-gallon tank for this engine.

To heat the water and potash, valve B is closed and A opened; cock C is opened to the coil. Provision has been made to take care of the expansion by connecting the coil returns to the return from the upper tank, which thus serves as an expansion tank, also. The potash is heated to about 100°, and the water is about 120°, while the jacket water averages 150°, and the return, 120° F.

All combinations needed can be had by manipulating valves A and B and cock C. A faucet for drawing hot water is in the line over the water tank. The pipe on the left of the cooling tank to the coil is used to relieve the coils of air when filling the system, as the filling is done through the tank return, also to heat the potash with water from the cooling tank.

The conditions for a successful installation were rather favorable in this shop, but the novel features introduced and the manner of operating, changed to suit local conditions, could be used with profit by many small plant owners. Before the change was

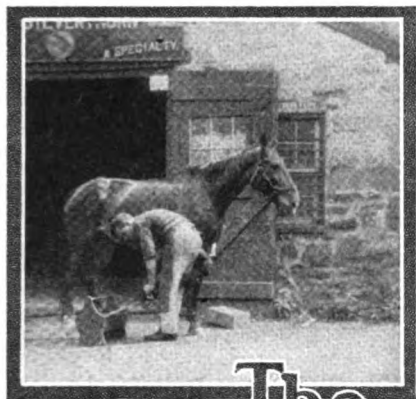


FIGS. 2 AND 3—SHOWING HOW THE WASTE HEAT WAS UTILIZED

made, steam heating was used at a yearly cost of \$300. Now, the heat formerly lost gives the same results. The engine, besides driving the machinery, provides the shop with hot



potash, hot water, heat for drying and a good exhauster, with the same gas consumption. The cost of the change was \$87.40.



The Horseshoer

The Horse and Horse Interests

Reports on activities in the buggy and light vehicle industry are extremely good, to say the least. It is said that one Indiana concern turned out eighty thousand buggies during last year, and this year this same concern is planning on one hundred thousand; and this is but one of the many concerns manufacturing light vehicles.

In harness circles it is reported that the industry is considerably hard put to take care of the orders and demands for completed fittings. A most prosperous season is looked for in the harness industry, and if the past year is any indication trade in the harness field should be well on the upgrade.

In the horseshoeing field, conditions point to improvement all along the line. Manufacturing reports show a greater quantity of horseshoes manufactured than ever before, and a continued increase in the manufactured lines is being looked for this year. Reports from the shop field show that horseshoers are generally getting better prices than ever before and that, while in some cases work has fallen off, the profits on the work done are better. Few complaints are heard of really poor or bad business conditions in the trade, and an exceptionally good year is looked for.

In vehicle repair circles the outlook is about equally promising. There are even fewer complaints of slack-

ness in this line than in horseshoeing, and all signs point to a most promising year.

People generally in fashionable circles seem to be returning, at least to some extent, to their first love, the horse, and a decidedly favorable influence will certainly be felt in all horse and horse equipment lines. That there is still work for the horse is being proven more and more strongly each day. The animal is in great demand, and higher prices are now being asked for good stock than ever before; so it would appear that those interested in horse equipment lines may well look forward to a prosperous and successful year.

Laminitis or Founder

Its Cause, Symptoms and Treatment

J. C. WEAVER

The laminitic foot is commonly called foundered and is also known as pumiced foot and as drop sole. These names are usually applied to practically the same diseased condition of the foot, and no matter by what name the shoer or owner calls the disease, the cure of the condition is pretty sure to be a problem for the farrier.

Laminitis or founder is an inflammation of the sensitive laminae, and may be acute or chronic. It is most common in the acute form, although it may develop very slowly. An animal may even develop a laminitic condition so slowly as not even to display any lameness or to lose a single day's work.

The most common cause of laminitis is inflammation of the mucous membrane of the bowels or lungs. A horse may get inflammation of the bowels from drinking very cold water while overheated, or from overeating. And in such cases, as soon as the acute symptoms of inflammation of the stomach subside, the animal may develop laminitis. The sensitive laminae is a continuation of the mucous membrane of the pulmonary and digestive organs, and experience proves that inflammation in the one organ is very likely to spread to the other. We, therefore, frequently see laminitis as an after-effect of pneumonia, interitis or a protracted case of colic; or it may result from a long journey on a hard road, especially if following a period of idleness. The coarser breeds of horses with heavy,

lymphatic bodies are more prone to the disease than finer-bred stock.

The symptoms of acute laminitis are very characteristic. The animal stands with the hind feet well under the body, while the front legs are extended. The toes of the feet are elevated and the heels only touch the ground. This peculiar position is the result of an effort to get the weight of the body off the front feet as much as possible. There is also a high fever with a quick pulse, and the face is expressive of great suffering. The body is bathed in profuse perspiration, and the slightest tap on the affected feet causes great pain. Of course the treatment of such cases requires the professional skill of the veterinarian, though it is necessary for the shoer to know something of the disease in taking up the after-treatment for which he will be called when the surgeon has cured the acute symptoms. During the progress of the disease, the congested laminae (Fig. 1) exudes serum around the toe. The unyielding nature of the wall does not admit of any swelling that would relieve the intense pain; thus the pressure of this exudation separates the sensitive from the insensitive laminae and forces the coffin-bone downwards. This causes the structural changes in the foot, as seen in Fig. 2. In a few bad cases the toe

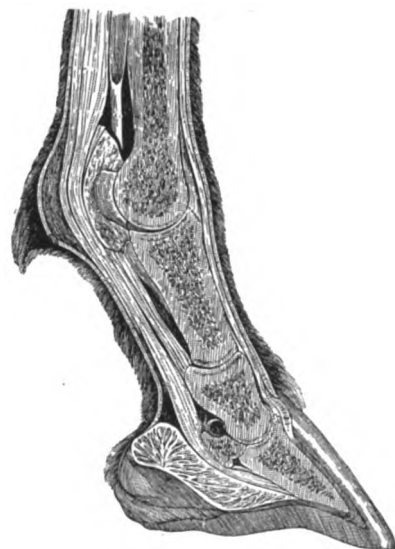


FIG. 1—SHOWING A SECTIONAL VIEW OF A HEALTHY FOOT

of the coffin-bone is forced through the horny sole of the hoof. As an after-effect of this serious disease, the sole of the hoof becomes flat or even convex. The growth of wall from



the coronet is slow, while the growth of horn from the sensitive laminae is excessive. The foot grows hardly any heel, while the toe is abnormally long, as seen in Fig. 2. The outer wall grows irregular rings and there is an abnormally developed frog. The laminitic horse has a peculiar gait so characteristic of the disease that horsemen can discern it afar. In an effort to save the toe (the injured part), the horse elevates it, sets the heel on the ground first, and walks in a heel-and-toe fashion. Those animals that have had severe attacks are fit only for plowing. But it is truly wonderful what a marked improvement will result from proper shoeing. It is common to see the shoes of laminitic feet worn off at the heel while the toe is almost as thick as when the shoe was put on. This heavy wear at the heel is the result of the animal trying to save concussion on the toe (the seat of pain). This undue concussion at the heels impedes the growth at that part, and as a result the heels of such feet are very low, but the frog grows abnormally high. Here is where scientific knowledge comes in. The unscientific shoer thinks that the tenderness is in the frog instead of in the heels and the sole. So to keep the frog off the ground he uses high heel calks, which imposes great weight on the tender heels of the foot, he throws the weight of the horse on the toes, adding greatly to the discomfort of the animal. It is possible to take cases rendered almost useless, and make them fit for work by scientific shoeing.



FIG. 2—SECTIONAL VIEW OF A LAMINITIC FOOT

Do not try to raise the heels to the normal height of a sound foot; the heels of laminitic feet are naturally low. You will observe in Fig. 2 that the sole is very thin. Don't make the

mistake of paring this away, or you may cut it through. As a rule, there is little or nothing to cut off the wall at the ground surface, but the toe will need rasping back at each shoeing. The correct way to shoe laminitic feet is with bar shoes and leather or

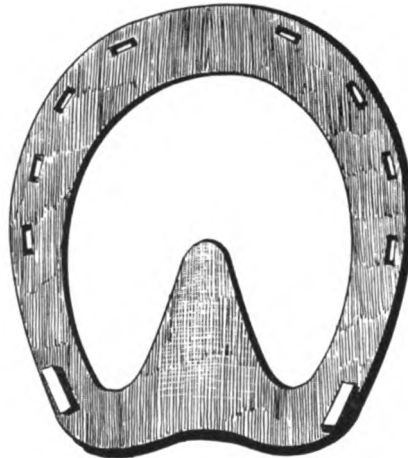


FIG. 3—THE PROPER SHOE FOR A LAMINITIC FOOT

rubber pads. If the feet have been shod with high heels for some time, the heels of the feet will be low and the frog high. For the first shoeing, arch up the bar of the shoe and weld a slug on each heel. Put plenty of nailholes all around the shoe—toe included—seat out, concave the shoe so that the tender part of the sole is relieved of weight. Then roll up the toe of the shoe and fit it so as to get but little weight on the frog; because this organ, being so long deprived of its natural function, will stand but little weight at first. At the next shoeing you will find that the heels have begun to grow, while at the same time the frog has begun to sink back to its natural position. At the third shoeing you may put equal weight on heels and frog, and as you lower the bar at each shoeing, hammer the slugs lower at the same time. When the frog has sunk back level with the heels, leave the slugs off altogether, as all laminitic horses travel with much more comfort without calks. In some cases it may be necessary to weld a plate across the shoe to protect the sole from injury by the projections in the road. Always use leather soles with tar and oakum. In shoeing an animal that has only just recovered from an acute attack, don't be disappointed because the improvement is slow; it takes time for nature to complete her repairs, but by care-

fully following the instruction, you may make a good worker of many a horse that is otherwise useless.

Thoughts on Timely Topics

By THORNTON

Caustic Censure and Cheery Comment

I'VE BEEN WANTING TO SPEAK to you about a certain type of human for goodness knows only how long, but I've just been waiting for a real good bit of inspiration; and I got the necessary inspiration today. The kind of chap I want to unload my mind about is the fellow who is continually telling everybody how to run their business. He seems to know more in one minute about the business of other folks than the average apprentice thinks he knows about smithing. A man of this type will happen in and want to know why you don't connect the forge blower with the tie-chains in the shoeing department, to blow the flies off the horses in fly-time; and then he'll wonder why you don't get all of the trade from the big trucking company, whom you've been after for two years and whose policy it is to divide their custom between three or four shops. And so this human pest keeps on asking questions and making suggestions until you rise up in your strength and throw him out. Of course you know the type; and you usually find that this same chap hasn't enough business interests to fill a hollow brain cell. If you take enough interest in him, you cannot find any trace of visible support; and you are inclined to believe that his wife either takes in washing or keeps boarders.

I RAN ACROSS BILL NORTON the other day, and he's changed about as much as a chorus lady after the show. Norton isn't his name, but some of you know this chap, and I've changed his name—well, because it wouldn't be just square to tell all he told me unless I did change his name. I met Bill over in one of the big towns, and this is what he told me while I helped him satisfy a gnawing that he said he'd had in his stomach for three days; and all that ailed Bill was hunger. So I took him over to a food emporium and listened to his story between mouthfuls. "I was a pretty good general smith when I worked for you, Ted," he began,



"and when I went down to Pittsburgh I got a bit more money and began to specialize in intricate forgings. I worked at one shop for several years and noticed that our place was getting quite a bit of a certain class of work. My helper became pretty good at my specialty and was finally given a fire, to enable us to keep up with the work. Finally I asked him about cutting out and going it in double harness. This sounded good to the other chap and we started. From the beginning things seemed to come easy, and I guess that was just what broke me. You know, Ted, I always had a fondness for the black bottle, and employers, I guess, expect a smith to drink to a certain degree. But customers don't expect the proprietor of a business to drink. Well, when we got going along smoothly I started to let up on the work occasionally and to get away on a tear. Finally, when the shop hadn't seen me for a week or more, my partner said I'd either have to sell out or he'd quit. I sold out, went to drinking worse than ever, and today I couldn't forge my own name. I'm down and out, Ted, and it's my own fault."

That's Bill's story in brief. I wanted to help him get back into the harness again, but he said it was useless. He said he hated to admit it, but he really didn't have enough ambition left to even attempt to get back on his feet. So after making some provision for his keep for a little while, at least, we left him to his fate.

"WHAT ABOUT ELECTRICITY as shop power?" asks a reader of our little item on gas-engine power. It's all right—it's fine—and it's everything the current contractor says about it—if it doesn't cost more than a six-cylinder limousine every month. If the rate is right, use it by all means, and you'll find another big load lifted off the shoulders of the poor, overworked smith. But remember, if the rate is high, you cannot argue with the meter when it comes time to pay. An electric meter is a device that has about as much conscience as the business end of a fighting mule, and you can't argue with it. It's been on the job so long for the company that employs it, that it's rather set in its ways and won't even listen to reason. But electricity itself is the greatest thing that ever entered the smith-shop. You can now connect it up to the drill, the blower, the

emery stand, the power hammer or anything else in the shop and tell the oil trust to go to Mexico. Electricity is a tireless worker that requires no sleep, neither does it call for any cuddling or fondling just at the time when you're ready with the final heat on a big axle. It never bursts its water jacket, and whether Mr. Mercury says it's 40 below or 140 above, you'll find Old Electricity humming away the minute you throw the switch. If you've got the juice flowing near by, and the price of a quart or two of kilowatts is not too steep, get the wires into the shop, by all means. You'll never really appreciate the perfect ease with which a smith-shop can be run until you get two copper wires running into your shop, and have flowing over those wires some stuff you can't see, but which does more work than a whole carload of helpers.

A Painting of Real Worth

The great oil painting, "The Blacksmith," by C. Kern, a well-known Austrian painter, was purchased some months ago by THE AMERICAN BLACKSMITH COMPANY. This painting has been exhibited in New York and elsewhere, and has aroused admiration wherever shown. It is now the property of the publishers of "Our Journal," and can be seen in the offices of THE AMERICAN BLACKSMITH.



"Well, Benton, you've returned just in time to give 'Our Folks' those pointers you promised for the business number," said the Editor, as the man of recipes walked into the forge room. "How did you make out?"

"Fine," returned Benton, dropping into his accustomed seat and accepting a cigar. "You know I promised to interview five

smith-shop owners and ask them what they considered was the secret of their business success. And I'm ready."

"That's good news," agreed the Editor. "Let us have your story."

"Well, the first man I asked said he thought his biggest trade-bringer was his practice and insistence upon calling every customer by name. If a man comes in only occasionally, he makes it a point to find out his name and to call him by name whenever he comes in; and he not only mentions his name when greeting him but makes it a point to mention his name frequently during the conversation. He says he can trace several regular customers to just this little matter.

"The next man I questioned said that he always insisted upon doing the best possible work. 'I use the best supplies I can get,' says this smith, 'take all the time I need to do the work the best I know how, and I charge accordingly;' and that man has as neat a shop as I ever saw. He works alone and is kept busy all the time.

"The third smith said he considered his success due to his up-to-date business system. This man said that he was pretty certain of this, because up to a year ago he was trying hard to sell out. Then he began to take notice, due to the business articles in 'Our Journal,' and he has since worked out a business system that shows him just where he stands at all times. 'It has really saved my business; it has taught me how to buy; how to work; how to economize; and all that means how to make a profit. And that is what I am doing now—making a profit and enjoying the game.' And I couldn't help but believe him.

"My fourth interview was with a smith-shop owner who just recently finished a concrete shop. When I asked him what he considered the secret of his success, he pointed to that part of his sign which read: 'Auto-Repairing Our Specialty.' This man showed me the remains of his old shop which he said he had not yet had time to clear away. 'I worked there,' said this smith, 'for twenty-four years, shoeing and repairing and doing general work. When the auto came I jumped into the game and, with the help of my son, we've cleaned up more in the past few years than in the previous twenty. We still do general work of all kinds, but it's the auto work that brings in the profit.'

"The last man I talked to, peculiar as it may seem, said just the opposite. In a town of fair size with four shops this man said the automobile was the cause of his success, but because 'I don't do any auto-work is the reason.' According to this smith, every other shop in town does auto-work, and as the town is quite a stopping place in summer for touring parties, the other shops are kept quite busy fixing up automobiles. This smith started on auto-work, also, but when he saw it interfering with a fair custom and trade in the regular lines he cut it out altogether, and now sends the unlucky motorist to one of the other shops. He says he has gained quite a bit of the shoeing and general smithing trade of the other shops and is better off in every way."

"That's all very interesting," said the Editor when Benton finished, "and it narrows this matter of success right down to the same old solution—administering just the kind of medicine best suited for the patient; and this question of automobile-work is merely a question of location, conditions and business ability. Your interviews and what you got through them should interest readers of 'Our Journal,' Benton. What you have said should be the basis of considerable thought for every shop-owner who has a question in his mind regarding the craft."



Grin

If you're up against a bruiser and you're getting knocked about—

Grin

If you're feeling pretty groggy, and you're licked beyond a doubt—

Grin

Don't let him see you're funk, let him know with every clout,

Though your face is battered to a pulp, your blooming heart is stout;

Just stand upon your pins until the beggar knocks you out—

And grin.

This life's a bally battle, and the same advice holds true,

Of Grin.

If you're up against it badly, then it's only one on you,

So Grin.

If the future's black as thunder, don't let people see you're blue;

Just cultivate a cast-iron smile of joy, the whole day through;

If they call you "Little Sunshine," wish that they'd no troubles, too—

You may—Grin.

Rise up in the morning with the will that, smooth or rough,

You'll Grin.

Sink to sleep at midnight, and although you're feeling tough,

Yet Grin.

There's nothing gained by whining, and you're not that kind of stuff;

You're a fighter from away back, and you won't take a rebuff;

Your trouble is that you don't know when you have had enough—

Don't give in.

If Fate should down you, just get up and take another cuff;

You may bank on it that there is no philosophy like bluff

And Grin.

—From Songs of a Sour Dough by Robt. W. Service.



Heats, Sparks, Welds

Get-a-head, means: use your brains—and you'll get there.

Get your happiness from your work or you'll never know what true happiness is.

When setting up the anvil, place it low rather than high and tip it slightly forward.

Time to swat the fly in your neighborhood, yet? Well, then, how about the dead beat?

You can hire a builder to build your shop, but you've got to build the business yourself.

It's the little things that count—but don't overlook the big ones. They count, too.

Ever hear a smith who was a real live wire say, "My business is as large as it can get"?

The good loser isn't always a loser—sometimes he's a winner, simply because he's a good loser.

How's this for a motto to success: "Buy close, collect sharp, charge right, never cut, always smile"?

A man can usually be said to be gaining in knowledge, when he begins to find out how little he knows.

Your work speaks for you. The louder it shouts, the better. But be sure it hollers in the right direction.

Infinite shortcuts in doing your jobs enable you to sidestep your competitor in workmanship and in price.

Are You Putting It Into Practice? See Timely Talks With Our Subscribers, and then—Put It Into Practice.

Having good, progressive ideas is one thing, but using them is another. Anyone can dig up ideas, but it takes nerve to use them.

Put the "sure" in your insurance by paying your premium promptly. A fire usually waits until the day after the insurance is due.

And now on the eve of a new season, remember that a base hit is worth more when the bases are full than a three-bagger does when they're empty.

Don't forget the B. L. Just as necessary to boost now as in winter. Keep a-boosting for the good old craft. Remember, "Boost, and the world boosts with you."

"Little drops of water make a mighty river." That ten-cent customer may be a ten-dollar one some time. Be painstaking and attentive on the smallest job.

A smith must keep comfortably ahead of Mr. Full Cost, to win in the business race. Don't be content with second place, or you'll never reach the goal of Profit.

And still, the straight and narrow path seems wide enough to accommodate all.

"Probably because so few are traveling on it," someone says. How about it?

Where's your gasoline tank, air tank and other motorist accommodations? Sign tell about them? The gold mine under your feet will never do you a bit of good unless you dig.

Those smiths with power shops can easily equip their places with a free air-tank to attract auto owners. The city repair shop, tire station and garage find it profitable, why not you?

The richer the prize, the harder the contest. Don't hesitate to get the right price for your work. Of course they'll kick, but when they appreciate your quality it'll be a different story.

So far—how does 1914 compare with 1913? Are you ahead, or don't you know? Simple business records will tell you just where you stand each year as compared with previous years. Are you posted?

Catalogs are the "log books" of the year's advancement. Every manufacturer is glad to send them, even though you don't intend to buy. Study them for pointers on new ideas and improved tools.

Turn added dollars into your pocket by hitching up to a good sideline or two. And the list of good sidelines for blacksmiths is about as long as your arm. Surely you can pick out one or two that will pay you.

"A sunny day," whined a blacksmith, built along the lines of our old friend, Tom Tardy, "is always followed by a rainy one." And he refused to be convinced that a rainy day was always followed by a sunny one.

Tom Tardy would rather pay two dollars for an old moss-covered receipt for a welding or hardening powder than pay one dollar for a modern, practical journal that will give him ten times as much value twelve times a year.

Increase your profits by decreasing your expenses and losses. You're in business for profit, not pleasure. When costs advance, push up on selling prices, and then you'll get what is coming to you. Do business in a business way.

Of course it's good to know what other people think of you, but it's best to know just what you think of yourself. Get thinking along that line often enough to do yourself some good. What do you honestly think of yourself?—is the question.

"Worth more to a shop-owner than any helper he can employ. I have all my copies and wouldn't take ten times their cost for them." That is what a Mississippi smith and reader says about THE AMERICAN BLACKSMITH. Tell your neighbor.

Tell your customer:

That an oak bark solution is good to toughen the shoulders of work horses.

To allow the horses to cool off a bit before giving them a drink; unless the animals are to be kept busy.

Remember, that your business consists of three distinct departments—one for getting trade, one for supplying the trade and the other for getting the money. The three must work together or they can't work at all. Does your system work together?

"A little knowledge is a dangerous thing." Why not be fully informed on subjects vital to your welfare? We have a selected list of books on blacksmithing, horseshoeing and kindred trades. Furthermore, we can supply you with any book you desire. Just ask Subscriber's Service.

No argument on earth can stand against the giving of credit—IF the credit is extended in a business-like way. It's the extending of credit indiscriminately that puts up the argument against credit business. In many ways there's no better business than credit business if it's done in a business-like way.

You'll get six months credit on your own subscription account if you will send us one new subscriber. Take this copy over to your neighbor now. Show it to him—point out the articles that help you—the articles that are real, live, helpful, practical advisers on the smithing business. Let your neighbor read it. If he wants to keep it, we'll send you another copy. But—before you come away get his subscription order. He'll be glad you got it, you'll be glad you got it, and we'll be glad, too.

Business is advancing with such mighty strides that every day there is a demand for a higher standard. Careless, slipshod methods will not succeed any more. Set your standard and then work up to it. Have a definite policy and not a "take-on-any-old-thing" attitude. Do business on a business basis. And, remember, there are no resting places on the highway of business progress. The only way to keep going is to keep going ahead.

Co-operation—that's the word to think about. Instead of cutthroat price-reducing, why not go to your nearest competitor and mutually adopt a scale of prices? Then, if a customer comes in, has you figure on his job, and then says, "Oh, I can get that work done for so much by your neighbor, So-and-So," you just gently inform him that he can't. Of course, "seeing is believing," and he'll go there and find out. Then is your chance to win his trade by courtesy, workmanship and advertising—get the idea?



Our Honor Roll

Worth \$5.00 a Year

That's what Mr. Ferree, proprietor of The Fix-It Shop, says about THE AMERICAN BLACKSMITH. And he backs up his statement by subscribing for twenty years in advance—his subscription account is paid up to July, 1935.

He knows THE AMERICAN BLACKSMITH—he knows it is the best paper of its kind—he knows he needs it in his business. You need it—you want it; then why not advance your account so that you need bother no further about it for some time. You can save money by subscribing for a term of years. It isn't necessary to subscribe for thirty or forty years to make a saving. Just glance over our long-time rate schedule and then pick out the time you want to subscribe for. Then note the saving you make. Even a two-year term enables you to save forty cents. It may interest you to know that the five and ten-year terms are the most popular. Better write in today—now—you cannot do it sooner.

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WADDINGTON FARM, W. Va.	Mar., 1928	LOUISA CARRIAGE WKS., Va.	May, 1923
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E. FOWLER, Pa.	Jan., 1924	R. H. KETTER, Iowa	Jan., 1923
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C. R. DAVIS, N. Y.	Dec., 1923	W. K. KLINE, Kan.	May, 1921
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W. B. ABELL, N. Y.	Oct., 1923	J. NARMITH, N. Zealand	Nov., 1919
W. R. TURNER, Man.	Oct., 1923	F. UNDERWOOD, S. Africa	Aug., 1919
C. NELSON, Neb.	Sept., 1923	F. RASE, Sask.	June, 1919
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J. LINDSAY, S. Africa	June, 1918	CLARK & FAUBET, Queens	Aug., 1917
J. H. GIBBS, S. Africa	June, 1918	C. L. HOCKETT, Cal.	Aug., 1917
W. W. BRIDGES, Ark.	June, 1918	H. C. STANLEY, Tex.	Aug., 1917
MATTHEWSON BROS., Iowa	May, 1918	M. DELJAGER, S. Africa	Aug., 1917
ED. HOLLAND, Queens	May, 1918	F. HOWARD, Kan.	Aug., 1917
H. L. HASWELL, N. C.	May, 1918	H. FERREL, Ill.	Aug., 1917
CHRISTENSEN BROS., Cal.	May, 1918	J. MCMBEKEN, N. Z.	Aug., 1917
W. H. COLLETT, S. Africa	Apr., 1918	F. H. GIERKE, S. Aus.	Aug., 1917
G. F. BRACKETT, Wash.	Apr., 1918	A. L. PITTENGER, Ill.	Aug., 1917
E. KOEPEK, Wis.	Apr., 1918	F. SPINKA, England	July, 1917
J. H. MARTIN MFG. CO., Ind.	Apr., 1918	J. P. KELLY, Md.	July, 1917
H. S. WAYNE, S. Aus.	Apr., 1918	F. G. STONE, S. Africa	July, 1917
H. S. YOUNG, Wash.	Apr., 1918	H. J. DEVONSHIRE, N. Z.	July, 1917
W. WELLSAUBEN, N. D.	Apr., 1918	V. J. HUBBARD, N. Y.	July, 1917
W. H. CHIFMAN, Mo.	Apr., 1918	J. C. SKINNER, Viet.	July, 1917
A. P. STROBEL, N. Y.	Apr., 1918	A. FARNACHT, Tenn.	June, 1917
E. H. ALBERTY, Pa.	Apr., 1918	H. A. CHERVEY, N. H.	June, 1917
J. R. JEFFRIES, Pa.	Apr., 1918	D. SHAFER, N. Y.	June, 1917
R. COLVIN, Ind.	Apr., 1918	W. R. GELLING, S. Africa	June, 1917
J. LIPPETT, Ill.	Apr., 1918	J. H. BAKKER, S. Africa	June, 1917
OTTO TITZ, S. Africa	Apr., 1918	A. R. HALLENBECK, N. Y.	June, 1917
F. E. SMITH, N. Y.	Mar., 1918	F. C. BOCK, Neb.	June, 1917
FLA. AG. & MECH. CO.	Mar., 1918	W. PRATT, Iowa	June, 1917
J. V. FISH, Ill.	Mar., 1918	J. H. STINER, Ohio	May, 1917
H. J. FISHER, Mich.	Mar., 1918	C. A. STEBBINS, Kan.	May, 1917
GEO. SMITH, N. Z.	Mar., 1918	W. S. SULLIVAN, La.	May, 1917
AVE. HOLLENAGEL, Ore.	Mar., 1918	H. SMITH, Queensland	May, 1917
A. E. UEBLING, Wis.	Mar., 1918	P. VANDERHAGEN, Minn.	May, 1917
J. C. YOUNG, Pa.	Mar., 1918	YOST & HALVORSON, Minn.	May, 1917
D. C. HOUCK, Ohio	Mar., 1918	W. MCCOY, Kan.	May, 1917
JOHN EYRE, Neb.	Mar., 1918	A. GUSTELT, Tex.	May, 1917
A. E. DELANO, Me.	Feb., 1918	C. F. J. LOBBE, N. Y.	May, 1917
S. J. STAPLES, Ohio	Feb., 1918	A. DATWYLER, Ohio	May, 1917
J. B. BOYD, Idaho	Feb., 1918	O. F. HOGMAN, Conn.	Apr., 1917
J. MOLITOR, Ill.	Feb., 1918	C. F. MATSON, Utah	Apr., 1917
F. P. FELLOWS, N. Y.	Feb., 1918	F. PATTY, Okla.	Apr., 1917
J. W. STRADMAN, Ohio	Feb., 1918	H. G. MARSHOTT, Utah	Apr., 1917
J. P. HOLZAPFEL, Penn.	Feb., 1918	E. THIBAUDAU, Wis.	Apr., 1917
E. N. GATTS, Vic., Aus.	Feb., 1918	W. PICKERING, S. Africa	Apr., 1917
RENTON WAGON WKS., Wash.	Feb., 1918	ED. BURROWS, England	Apr., 1917
WHITING Fdy. Equip. Co., Ill.	Feb., 1918	L. KAUCER, Wis.	Apr., 1917
J. P. KOENIGS, S. Dak.	Feb., 1918	J. M. BROWN, Tex.	Apr., 1917
RICHARD BRENNER, Tex.	Feb., 1918	J. WEBER, N. Y.	Mar., 1917
W. F. HILL, N. C.	Feb., 1918	G. W. ROAT, Pa.	Mar., 1917
O. O. GODFREY, Wis.	Feb., 1918	W. E. MEAD, Mich.	Mar., 1917
M. C. BETTIS, Tex.	Jan., 1918	I. STAUFFER, Pa.	Mar., 1917
P. SEITZMANN, Cal.	Jan., 1918	D. J. SILVIS, Pa.	Mar., 1917
J. B. BETTIL, Me.	Jan., 1918	G. SHOEMAKER, Pa.	Mar., 1917
W. MINCABLE, Queens, Aus.	Jan., 1918	P. PHEIFFER, Ore.	Mar., 1917
S. PORTERLAND, Que.	Jan., 1918	W. WATSON, Vic.	Mar., 1917
D. C. FOLLY, Cal.	Jan., 1918	W. BAGLEY, Mass.	Mar., 1917
GILMAN BROS., La.	Jan., 1918	B. E. CAMPBELL, Mass.	Mar., 1917
C. E. KRUG, Wis.	Jan., 1918	P. RUPPER, Ill.	Mar., 1917
G. E. WOODARD, Kan.	Jan., 1918	G. STANKE, Wis.	Mar., 1917
P. J. DALLY, W. Aus.	Jan., 1918	W. H. MILLER, Mo.	Mar., 1917
J. MORROW, Pa.	Jan., 1918	J. C. WOODS, W. Aus.	Mar., 1917
O. HOGA, N. D.	Dec., 1917	C. BOULZON, N. S. Wales	Mar., 1917
G. W. MILLER, Penn.	Dec., 1917	C. A. HAWKINS, Ore.	Mar., 1917
G. M. SEYMOUR, Ill.	Dec., 1917	A. L. MONYCOOT, W. Va.	Mar., 1917
J. TEMPLETON, Scotland	Dec., 1917	J. PETERSON, Ia.	Mar., 1917
F. PROCTER, Tas.	Dec., 1917	J. ANDERSON, Tas.	Mar., 1917
J. G. JOHNSON, Ill.	Dec., 1917	A. J. NEILL, Vt.	Mar., 1917
F. E. EGLERS, Ohio	Dec., 1917	ED. DEITRICH, Ind.	Mar., 1917
C. T. FORREST, Cal.	Dec., 1917	LEWIS CRANE, N. Y.	Mar., 1917
TERO. BUSE, N. Y.	Dec., 1917	E. O. LEE, S. Dak.	Mar., 1917
J. T. ELLIOTT, Ill.	Dec., 1917	S. STAMPLE, Ohio	Mar., 1917
J. VOELPEL, Ill.	Dec., 1917	R. S. GUGISBERG, Kan.	Mar., 1917
W. J. MAIN, Cal.	Dec., 1917	J. S. HASKELL, Col.	Mar., 1917
J. G. LAUER & SONS, Mo.	Dec., 1917	W. L. ROAME, Tex.	Mar., 1917
MESSE BROS., Victoria	Dec., 1917	A. R. BARLOW, Tex.	Mar., 1917
E. BLOOMER, Aus.	Dec., 1917	C. A. WHITFACER, Ohio	Mar., 1917
I. N. PITZER, Ore.	Dec., 1917	B. P. CANNY, Ill.	Mar., 1917
W. A. REAGAN, Pa.	Dec., 1917	C. STOCK, N. Z.	Mar., 1917



Your Trade Paper

Its Appeal and Power

ELBERT HUBBARD

The brain is an organ and its function is to think. And our sanity is determined by the mental voltage we carry.

So long as we are live wires, so long as we transmit power, radiate love, give out sympathetic warmth, think individually and act collectively, we establish our right to live.

But a lazy man, whether his sluggishness and slothfulness is mental or physical, is as useless as a dead man—and takes up more room.

The world is made up of two classes—the routiners and the pioneers.

The former class are the smug, self-satisfied folks who carry caution to excess. They are the cause of inefficient efforts to eliminate inefficiency. That is to say, they are a drag upon the wheels of progress.

To do certain things in a certain way is eminently proper, but we now want quicker methods, more serviceable systems. We want things “right now.” And the concern that gives them to us—right off the bakestone—is the one that gets our business.

Whilst perhaps it is true that the American business man is in too big a hurry to attend to detail and while it may also be true that we may leave our margins too big and untrimmed, still there is no useful purpose served in a too slavish allegiance to moth-eaten, rust-worn rules and regulations.

When a man satisfies himself that his name plate—John Jones, Blacksmith—is all that is necessary to get business (“for everybody knows that the Jones’ have been in the business five generations”) he is in his coffin, for he is a dead one. Routine killed him. He lacked imagination and the blessing of anticipation.

Imagination and anticipation is the double cylinder, expansion engine of humanity.

The pioneer is blessed with a full equipment, and his life speaks of prescience, strength of character and courage. His anticipation is a sort of prophetic vision, a kind of instinct.

The power of a seeing mind is tremendous—and it belongs to the man who exercises his gray matter by ceaseless inquiry and search.

The pioneers are the anticipators, the routiners are red-tapers.

Our huge liners as they cross the ocean, ever have a man in the “crow’s nest.” He’s on the look-out. And upon his wideawake, alert sight, depends much of the safety of the ship, cargo, and human freight.

To him every object that enters his vision is full of meaning and is duly noted, reported and recorded by the officers.

The simile seems to me to be especially happy as applied to the editorial department of Trade Papers, of which we have such a splendid representation in this country.

Nowhere in journalism is there a finer array of talent than is to be found in the columns of these informative and trade-reflecting papers.

There is absent that flippancy and flummery of the cheap newspaper.

Instead, your Trade Papers are full of facts that are throbbing with pulsing life and vigor. There are to be read articles that have the saving literary savor, the salt of common-sense, and the tabasco of criticism.

Your Trade Paper is the happy medium between the “excruciatingly funny” comic section of our newspapers and those magazines for mummies that are wrapped in a most humorous sadness.

Your Trade Paper treats of its subjects in a manner that is exhaustive but not exhausting, comprehensive yet concise.

There is more in the power of timely suggestion than most of us dream of. And the value of these papers to many people is not only

in the actual articles written, but because of the cycle of thought it occasions—the mind images it gives—the breadth of life it breathes into the crude creations of their imaginations.

The Trade Paper crystallizes thought for us. It presents to us mental pabulum in cubes and tablets.

No longer do we need search laboriously for the meat of the subject, it is right there, served in plenty and garnished with truth and accuracy.

The editorial department is not made up of Gratianos—whose reasons were like two grains of wheat in a bushel of chaff and, when found, not worth the search.

The Trade Paper is a true source of inspiration and power, and as an antidote for declining business, as a tonic for flagging zeal, for ennui or *laissez faire*, it is worth “a guinea a copy.”

Inspiration without preparation is useless.

But the preparation must be clear and defined or the creation will lack dignity, purpose and service.

And inspiration comes only from the beautiful. Love is a by-product of Art; and inspiration is a by-product of work that is positive and specific.

The Trade Paper caters to the specific needs of its subscribers, and in so doing entertains and demonstrates the beneficence of co-operation.

Co-operation is the fulcrum of future success—social, commercial, national and international.

The Trade Papers believe in this companionship, this helpfulness and mutuality. And in their well-edited, well-written columns, is to be found the incentive to vigorous effort, unselfishness and success.

For the dealer, worker, businessman—the Trade Papers are invaluable. They are as full of ideas as an arsenal full of ammunition; as full of food as an egg is full of meat.

Controlling the policy and filling the pages of these class publications, are men of tried integrity and specialized ability.

And so we look to the Trade Paper with eager confidence and have the supreme satisfaction of knowing that we shall be able to find there one of our sources of power.

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Shoeing Contest at Iowa State Fair

The Iowa State Fair held at Des Moines, Iowa, August 26th to September 4th, has decided to put on a horseshoeing contest this year. This is the first time that such a contest has been held at this fair.

Professor C. F. Curtiss, Dean of the State Agricultural College at Ames and Superintendent of the Horse Department at the Iowa State Fair, is responsible for putting on this contest. He has been studying the competitions that the big fairs in England and in Canada put on in the trade of blacksmithing. The importance of the draft horse industry and the wonderful exhibit of draft horses always made at the Iowa State Fair has led the management to feel that proper shoeing of horses and especially draft horses should be encouraged.

There will be five prizes offered, as follows: First, silver medal and \$25.00; Second, bronze medal and \$20.00; Third, diploma and \$15.00; Fourth, diploma and \$10.00; Fifth, diploma and \$5.00. These are the conditions of the contest:

1.—Entries must be made with the secretary on or before August 1, 1914, accompanied by a fee of \$2.00. This will entitle the contestant to an exhibitor's ticket, good during the fair. This ticket will be forfeited if the contestant fails to participate in the contest at the time specified.

2.—Horses for shoeing will be provided by the State Fair management. Forge, fuel, anvil and vise will be provided by the fair. All other materials and tools must be provided by the competitors.

3.—The competition will be held in the horseshoeing tent, commencing at two o'clock on Monday afternoon, August 31st, and continuing each afternoon during the fair, at the same time and place, until all contestants have competed.

4.—Each competitor must remove two old foreshoes from his horse, and make, fit and fix two new ones from plain bar iron; lots having been previously drawn for the order in which they will proceed to work.

5.—The style of shoeing will be the ordinary cart horse shoe, without side clips or toe-pieces.

6.—Each competitor will be allowed one assistant or striker to help

him in forging and to hold the horse.

7.—The maximum time allowed to each competitor for the complete operation will be 1½ hours, and the judge will be requested to allow points for rapidity of execution within that limit.

8.—The judges will be appointed by the fair management, and the

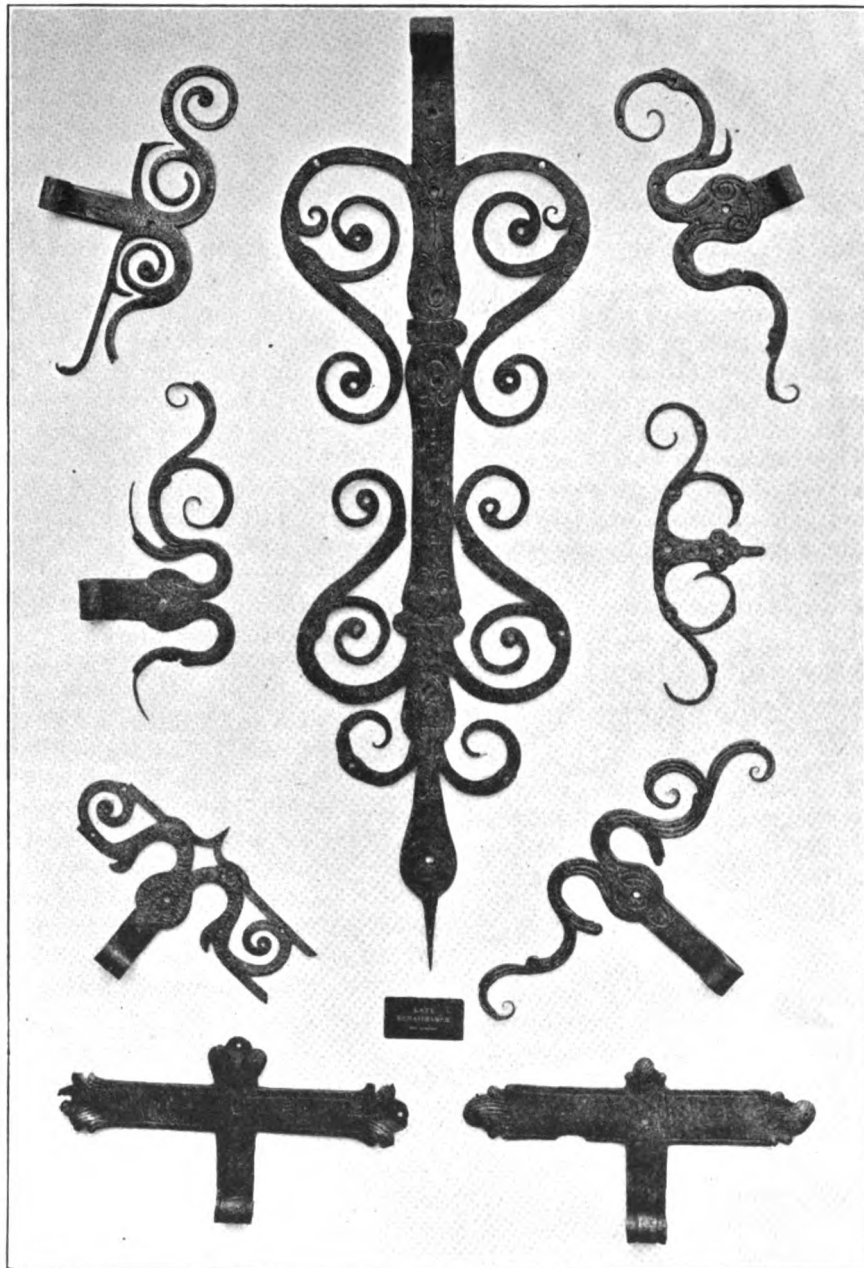
General finish 10

Time 10

—
100

The judges will note and make observations on the following points which will have a bearing on the decisions rendered:—

Work at the anvil. Hammering



SOME HAND-FORGED WORK OF THE LATE RENAISSANCE PERIOD

competition will be subject to all general rules of the Iowa State Fair.

The following scale of points will be used by the judges in making their awards:

Making shoes	35
Fitting	30
Driving	15

and heating. (Limited heating and liberal hammering give tougher and better wearing shoes.) Keeping the fire and handling shoe in the fire. Cutting gutter so that nailheads will be straight and firm when driven. Punching nailholes the right size and angle. Paring of the hoof. Fitting



THIS WELL BUILT SHOP OF OHIO IS OPERATED BY MR. A. E. WEARSTLER

the shoe without too much burning. Driving of nails at proper place in wall of hoof. Cutting and clinching the nails. Finish and neatness without too much rasping.

The blacksmiths who wish to enter this contest should write to A. R. Corey, Des Moines, Iowa, Secretary of the Iowa State Fair, and ask for a premium list which will give all the details of the contest.

Axles and Wheels: Their Proper Relation

Onward

In the January number, Mr. Gunn answers Mr. Riffe regarding length of axles, and advises making the front axle longer than the rear one. These problems were solved scientifically years ago, and the solution published in the trade journals of that period, but a new generation of mechanics has now come on the stage and it may be well to briefly state these conclusions.

There is a scientific reason for everything done on a vehicle. We will consider the wood hub and staggered spoke wheel. It is evident that the maximum carrying strength of a spoke is when it is perpendicular—hence the “plumb spoke.” Spokes are tapered from the back, and the outer spoke carries most of the load. It therefore follows that the outside face of the outer spoke is the plumb line. The tread should be at an exact right angle to the plumb line of the spoke, which insures a level bearing of the tire. If the axles are set to a plumb spoke, the difference in height or dish of wheels does not change the

length of axles, but the pitch of the arms differs. Where the dish is the same, the difference in height does not matter. The wheel with greater dish must have more underset to the axle to bring equal track measure.

In practice we set the axle on light vehicles slightly under plumb, to allow for the spring of axle under load. The difference in measurement at the top of the wheels, called “swing,” has no importance whatever.

Mr. Peterson is right in his way of getting length of axle, but he says measurement from out to out of the rim on the floor will correspond with the width from out to out of the spokes at the hub. This is fairly accurate on narrow-tired jobs, but quite wrong when using $3\frac{1}{2}$ or 4-inch tires. If he will use the word *spoke* in place of *rim*, the width of tire used will not matter. We must have a level bearing of tire in all widths.

“Gather” of axles, meaning the inclining forward of the arms to cause wheels to run to the collar, is wholly wrong in theory, as it increases the draft. In practice we “gather” just a trifle, say $\frac{1}{4}$ inch over all, to prevent nuts getting loose. “Gathering” axles was almost universally done 40 years ago, and the rule was to gather a dimension equal to the width of the tire.

We believe the practice had its origin in the early days of strap axles and lynch pins and loose fitting rings or boxes. The pins were sometimes lost, but if there was considerable gather in the axle, the wheel running to the collar would lessen the probability of accident. When iron axles

with nuts and close fitting boxes came into use, the smith continued gathering axles from force of habit or because “Grandfather did.” Gather is necessary on platform spring wagons without reaches to counteract the tendency of springs to pitch forward. This rolls the axles a little and turns the underset into a reverse gather, but it requires very little to do this.

The most encouraging feature of trade conditions is the increasing interest in discussing these practical ideas. Although there may be differences of opinion on certain points, the general effect is beneficial to the craft. If any brother craftsman has different ideas, let him write to THE AMERICAN BLACKSMITH, and we will argue it out.



The Machine and Tool Smith

Making Tools and Formers

C. P. S.

The man working with tools can make a hundred times better showing than a man who works on an anvil or by hand; and not only that, his work is not so tiresome. Some men suggested that we make tools only for jobs on which we have a great deal of work, but I believe that it pays both the foreman and his company many times over to make tools or formers for one-time jobs too. I had an example of this recently. A man came to the general foreman with a broken manhole plug. The general foreman was in doubt as to whether or not the blacksmith could make the plug, as it is usually a job for the foundry. However, the man was sent to the blacksmith shop, and the blacksmith foreman referred him to



me. I told the man I could make it, and told him to wait for the job.

I got a bar of square steel and made a ring the size of the manhole. The man protested at this and said I was not making what he wanted. I replied that I did not care whether he wanted it or not, but that I did want it. He went to the foreman about it, and was told that I would make him just what he wanted if he would wait. After I had the proper ring or former made, I took a suitable piece of soft steel, large enough to cover the former, heated it and dropped both under the steam hammer. I trimmed the surplus off, put the proper radius in, had the holes drilled, and the man was satisfied. He took the plug with him. So I believe that it pays any company at times to make a tool or former for just one job alone, but not always.

The Piece-Work System in the Railroad Shop

G. E. LEWIS

I have had about 29 years of experience with piece work and think it is the only fair way to have the work done. When the piece-work system was first started at the Baltimore shops there was a great deal of prejudice against it. The men seemed to think it was only another way of getting more work out of them, but they soon found that there was an advantage in it for them; and at this time if you ask a man to work day work he will become dissatisfied at once. I believe that all work should be done piece work. One of the worse things to contend with is that the prices are not set right at the beginning. If you get the price right at first you will not have much trouble.

When you set the price on a job of piece work be fair to the men as well as to the company and you will have the respect of both. Any man that is willing to do an honest day's work will want piece work, as he will be paid for all the work he can do. The only men that we find objecting to piece work are those whom you could not trust to do a day's work.

We have gang foremen that check the men on and off the jobs. These gang foremen should be men who will not show partiality to anyone, as the men will soon get dissatis-

fied if they are not given fair treatment.

I find that piece work is much easier for the foreman, as he does not have to watch over the men to see that they do their work properly. If a man does not do a job right, the work is returned to him and he is made to correct it at his own expense. It is a mistake to think that a man will not do good work on piece work. The piece-work system has many advantages over day-work. If you have to estimate on a job of work, you know before you start what it will cost.

Some of the foremen seem to think you cannot do repair work on a piece-work basis, but it is just as easy to do repair work as it is new work. If we repair a chisel we pay so much for the head and so much for the blade; repairing a pair of tongs, so much for each jaw; and so on for all odd jobs that we do.

There is another point—you will find that the man who works piece work will have his mind on his work more and more, and you will find him studying out some way by which he can increase his work,

age him to improve the tools and give him credit for improvements that he makes."

Some Casehardening Hints from a Trio of Foremen

We have double-deck furnaces especially designed for our spring work and casehardening, and use cast-iron boxes and lids. The pieces to be hardened are packed in one of these boxes of a size suitable to the pieces. Pack the box carefully with the article to be hardened, allowing enough potash when dissolved to cover the piece. Lute edges of lid with fire clay, to make box as near air-tight as possible. Allow box to remain in furnace from eight to ten hours at about 1600° F. Good results cannot be obtained with a heat that is not uniform. If the heat is too low, satisfactory carbonization cannot take place.

* * * * *

In casehardening I have for the past twelve or fourteen years used carbonated bone with prussiate of potash next to the work when I pack



THEY KEEP BUSY IN ILLINOIS, AS SHOWN BY MR. J. H. BOMGARDNER'S DISPLAY

which will mean more output for the shop and a saving to the company.

I would say right here—"Do not cut the price because the man is making more money, but encour-

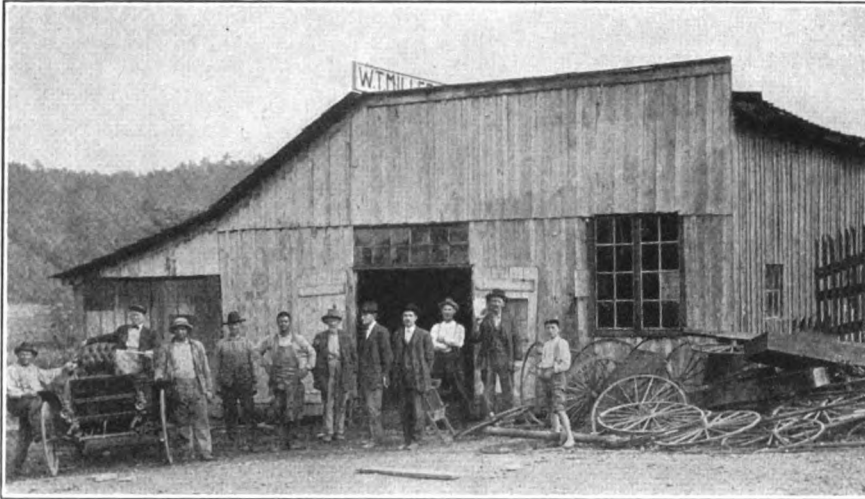
my box. I like a wrought box, as it is a little lighter to handle, heats through quicker and will stand more heat than a cast box. However, a cast box will stand a heat high enough, but you have to watch it more closely

than you would a wrought box. I generally burn from twelve to sixteen hours, and always take a test piece of $\frac{3}{4}$ or $\frac{1}{2}$ inch round and have $\frac{1}{16}$ or $\frac{3}{32}$ inch on test, which will give me about $\frac{1}{16}$ or $\frac{3}{32}$ inch on an ordinary

terial. Place lid on, and lute all edges well with fire clay.

The length of time required in casehardening is regulated by the depth of the casing desired and the size of the pieces. At the close of

buggies and wagons. I keep repairs for most all kinds of mowers in stock. My tools consist of hot and cold tire setters, post drill, Buffalo blower, tire bolter and all smaller tools usually found in a country shop. Business has been very good for the past year. W. T. MILLER, Kentucky.



THE GENERAL SHOP OF MR. W. T. MILLER OF KENTUCKY

size link or block, which I think very good. On roundhouse work, or hot work as we call it, I use Diamond Brand Hardening Powder, the same as cyanide of potash, and get a good thin sheet around the bolt, or whatever it might be. I have only a draft furnace for spring work that I do my casehardening in. It is a good one, and I get very good results, but I hope in the near future to get an oil furnace, which I think will be a time-saver to me and a money-saver to the company.

I generally pack my own box, see it put in the furnace and see that red heat is kept on it, if possible. I dip in a clean water bath with wire netting in the bottom, so as to keep the water all around my work, which keeps the article straight and cools better. I never used bone dust but once. I tried it the second time, and never got good results.

* * * * *

To obtain the proper results in casehardening, a lot of pieces which resist wear in general should be packed in a cast-iron box of suitable design, say 9 inches deep, 18 inches wide and 30 inches long, with lid to suit. Cover bottom of box with 1 inch of your carbonizing material, then place your work to be hardened 1 inch from ends and sides of box, and $\frac{1}{2}$ inch apart; now cover this with 1 inch of your carbonizing ma-

the carbonizing period, the box should be allowed to cool with the work undisturbed until cold, then removed from the box and reheated slowly from 1450° to 1472° F., and quenched in cold water, oil or brine, as the hardness requires. It should then be removed from the furnace and allowed to cool. Then reheat and quench.



Queries— Answers— Notes

Tempering Bear Traps.—I would like to have some information for tempering springs for bear traps. Will some brother who is familiar with the work, let me know how it is done? M. F. GERAGHTY, Quebec.

A Kentucky Shop.—My shop is 60 by 30 feet. I carry all material used and also sell to other smiths. I carry pumps, barn door hangers, bolts, whips, etc. I do all of the work myself, except in summer when I find it necessary to have a helper. I do some auto work, but my principal work is on

Driving Wagon Spokes.—I have earned so much from "Our Journal" and contributed so little that I just want to give the boys a little kink on driving wagon spokes: Size your spoke so that it can hardly be driven in the ordinary manner. Then slip the tenon in water for about one minute, remove from the water and hold another minute or so to allow the water to soak into the surface; then drive it home with a sledge and it is there to stay. A little experience will teach one just how much oversize can be left on the spoke and still get it into the hub.

OTTO A. WAGNER, Kansas.

Oxy-Acetylene Answers.—In reply to Mr. Fleming's inquiry in the February paper, I will say that the $\frac{3}{4}$ -inch pipe on the torch filled with mineral wool is a flash-back arrestor, but I think that it is necessary to use another on the generator, also, as the rubber tubing might blow off or fire get behind the mineral wool in some way. Of course, this is not absolutely necessary, but it is well to guard against an accident. The thickness of the tanks will hold the threads, although if I were making another machine I would bolt a flange on at this place, thus making it more solid.

A. H. WATCHOFF, Colorado.

Ice Plant Query.—We would like to be informed through the columns of the paper how to build an ice plant. We would like to build one large enough to make 1000 pounds of ice at one time.

Our shop is 32 by 66 feet, and our equipment consists of a band saw, circular saw, emery stand, turning lathe and power drill which we run by a 3-horsepower International engine. We have one electric blower and two band blowers. Electricity is too expensive to use to any great extent. We have to pay ten cents for a ten-hour kilowatt and in addition to this, 25 cents per month for meter rent.

BECK & BROWN, California.

Farmer-Smiths in Canada.—There are many farmer-smiths in these parts that try to do their own work and only come to a shop when they get stuck.

One man tried to shoe his own horse (a mare worth \$300), and she became lame. The owner thought her frog was too large so he pared it down and the mare got worse. He then removed the shoes, but the lameness still remained. As a last resort he came to me to see if I could remedy the trouble. As soon as I lifted the foot, the trouble was at once apparent—the frog had been pared to the quick. The beginning of the trouble was due to a nail being driven up too high. I put on a pair of good, heavy shoes and instructed the owner to give her a rest; the mare is all right now.

H. P. SOMERVILLE, Canada.

That Axle Question.—I note in your January number, Brother Peterson explains axle lengths and how to set them. I agree with him in the rule of lengths and the plumb spoke or bearing, but cannot understand what the taper of the "spindle" has to do with gathering the arms to the front $\frac{1}{2}$ inch. I give axles about the same difference between front and back as he does, because the dish of a wheel tends to pull the wheel away from the collar and to bear hard on the nut when running; according



to the law of momentum. Brother Peterson should observe that a box revolves around the "spindle" fixed in the hub. Were both straight, instead of being tapered, he would have the same results, because we set axles from their centers. The taper obeys the same law of gravity that a straight "spindle" does.
W. H. GUNN, Virginia.

Making a Polishing Wheel.—As an old lady once remarked in my presence, "every good bee brings something to the hive," and having read a brother's inquiry on how to make buff or polishing wheels I herewith submit a method which has proved very successful with me. I made some sixteen years ago and I can recommend them as first class.

They are made by sawing off three one-inch boards that will work to the size you want. Nail them together in such a manner that the grains will cross at an angle and so that the nails will not hit the tools in turning. Nail a block on the rear side to fasten into a lathe chuck, then turn it to a circle and bore the hole before removing. Do this with a lathe tool and it will be true. Then take some four-ply cotton belting, five inches wide, and nail down on each side around the wheel. This prevents the nails flying out as the strain comes sidewise on them. If a man has a lathe he can make a large number of them in a short time. The glue and emery sticks well and the surface throws out just right.

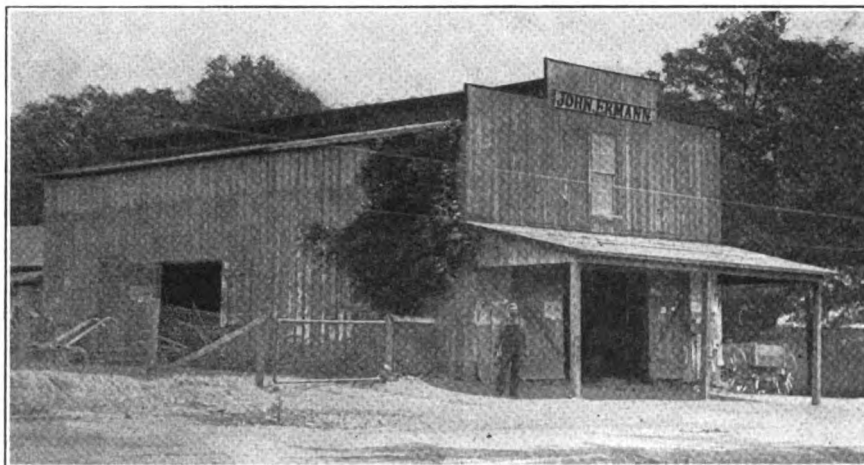
R. H. GLEASON, South Dakota.

A Power Shop of Arkansas.—The accompanying two pictures of my shop shows the interior, and the exterior which is 28 by 48 feet, two-story, with a 16 by 40 by 28 triangle, one-story, behind. I have been in the general repair business here for about fifteen years. I am located five miles outside of town on the main road. I own one and one half acres, including my shop and residence. The cut of the

side. However, you will be enabled to judge this by picking up the foot and examining it when the shoe is worn out. In this way you can determine just how the feet need to be cut or trimmed in order to prevent interfering. A horse's ankle never bends toward the inside and he never cuts the foot in the air, but he does cut the foot on

In Reply.—Over-reaching is generally the result of some other deeper cause. Laminitis or shrunken hoof and dried-up frog are possible causes. Of course these causes should first be ascertained before attempting to shoe the hoof.

If the animal has been highly fed, a cooling diet of bran mash, with a teaspoonful



THE ARKANSAS GENERAL SHOP, RUN BY MR. JOHN ERMANN

the ground. Of course, if the ankle is inclined inward, striking will result. You cannot avoid the horse interfering if the floor man trims the feet, because you don't know where they have been trimmed. It is advisable to leave the foot as full on the inside of the toe as possible. This will give him a good bearing on the ground, and any amount of filing and fancy shoeing will not stop him from cutting.

Regarding clips on the toe, I think they

of nitrate of potash in each feed will greatly help to relieve the sore feet. If the hoof is shrunken and dried, remove the shoes and poultice the feet with hot bran mash for a few days.

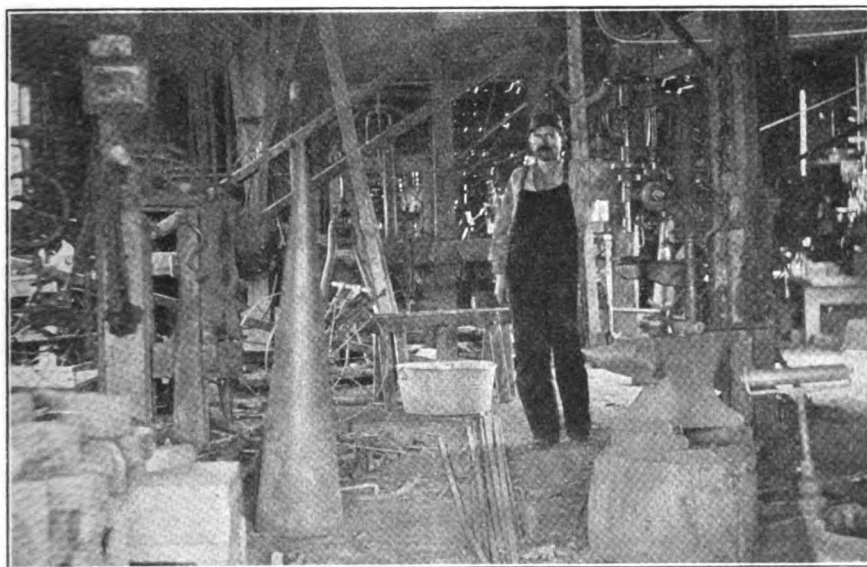
The feet being ready to shoe, use a light but wide-webbed bar shoe, punch holes around the toe and fit the shoes so as to relieve the heels of weight. Now to restore the normal angle of the foot and pasterns we must raise the heels. To do this, weld a steel slug on each heel, roll the toe of the shoe at the "breaking-over point," as shown by the wear of the old shoes at the toe, and apply the shoe with a leather pad, tar and oakum; nail the toe and leave the heel nails out. Being properly shod, the front feet should quickly get out of the way of the hind ones.
C. A. B., New York.

Founder.—I want the craft to give me some advice regarding a horse that has been foundered and the side of the hoof cracked and very tender. I have copper plates on now and am using Corona woolfat, but the animal is not getting along as well as I would like. Any information will be thankfully received.

V. J. HILDRETH, Kentucky.

In Reply.—The causes and treatment of founder or laminitis as it is technically known are many and varied. Laminitis is a dangerous disease, and the shoer is not expected to do more than shoe the animal, so as to minimize the jar and concussions. In chronic cases, where the horse is used for work, shoe with light shoes and sharp but short calks. If the horse shows lameness and tenderness, use rubber shoes. (Continue the use of the Corona woolfat; it will help the treatment.) The hoofs should be kept soft to prevent contraction which would greatly aggravate the trouble. The subject of foundering is too broad for us to discuss here. Specific advice is needed and I would suggest taking the horse to a veterinary surgeon or else getting a book on this subject. In the January number, Mr. Pinck gave "A Radical Cure for Quarter Crack," which should aid in treating your case.

M. B. D., New York.



AS SHOWN, MR. ERMANN'S SHOP IS WELL EQUIPPED WITH POWER TOOLS

interior of my shop shows a view from the front entrance which gives a good picture of my equipment. The largest tool I have is a 12-foot lathe with a 24-inch swing.

JOHN ERMANN, Arkansas.

More Information on Interfering.—I will attempt to reply to Mr. Finley's article on interfering horses. I find that the feet of some horses require to be cut or trimmed down on the inside and others on the out-

relieve the strain on the nails, especially when they stub along the road.

T. W. BILLYN, New Jersey.

Over-reaching.—I have been very successful in shoeing horses with the exception of ones that over-reach. I have several in my district, and would like to hear from some brother shoer through the columns of the paper, on shoeing for this trouble.

E. TROYKE, Illinois.



The Two-Handled Hammer.—Brother Weaver asks for information concerning a two-handled hammer. There is such a tool in use in some of the steel mills, and I have heard some of the older men from across the water tell of two, three and even four handles, but such tools have given way to steam and drop hammers. I have done the work Mr. Weaver speaks of with a heavy weight and a pair of slip tongs like the accompanying engraving. These slip tongs are strongly made, to hold the heavy weight. The weight is drawn up by a block and tackle where it is held by its ring in the jaws of the tongs. The handles of the tongs are held by the ring, C, which is pivoted at B. At the other end of the trip bar is another ring, A, to which a small hand line is attached. When this is pulled in the direction of the arrow, the upper ring is pulled off the handle, the handles spread, the jaws open and the weight falls. Care must be taken, however, to see that the line that trips the tongs is kept clear, as only a slight pull will loosen it. A block and tackle to hoist the weight is all that is required. If used to a great extent it would be well to make guides for weight to run in. I trust this may be of some help to Brother Weaver.

HOMER N. POPE, Connecticut.

Tempering Taps and Dies.—Some time ago I saw an article in the journal on tempering dies, which I believe was written by Mr. Hillyer. I have this article pasted in one of my forging books. Now, in the woods, we often get taps and dies which have been used by someone who knows nothing about the care of tools and they are, of course, in bad shape. A great many may know how to take care of such tools, but to repair them is quite another thing. To ask for a new set of taps and dies would seem foolish. I would like to have instructions from Mr. Hillyer on all the steps necessary to make a good job.

Here is my way of doing the job: First of all, I cut a butt down, so that the dies will be close enough to be reached by the taps. I then draw the temper, soap the bolt, put the dies in black and adjust the dies to fit the bolt, then fill with babbitt metal and take out the butt and taps. I then take the dies out of black and file off a little from the opposite shoulder to give clearance. Then heat and temper in oil, and draw to a dark straw which threatens to turn to a coffee color. Treated this way they have always seemed to do better and to stand the wear longer. But as I have never seen a practical man at this work, and am not familiar with all the steps which are probably necessary in the complete finishing, I would like to have full directions.

D. C. FORSTH, Ontario.

A Letter from Texas.—I am located in a small town on the Orient Railway and am doing a good business. I have been at this place nearly six years. I am the pioneer blacksmith here and, strange to say, am still without competition and have had a good business ever since I started here. Many smiths have come, looked at the town and location and have said they were going to put in against me. But they have always gone away and never returned.

The mortgage system is beginning to cut such a sway that I think we had better begin to try to secure the lien system in this State. Still, I don't work for Tom, Dick or Harry without an assurance from the landlord or from some other source that the customer's reputation is good. But then we get soaked enough when we work on credit. I have worked for men, while I was working for wages, who would allow their customers to run bills for twelve and eighteen months without a settlement and, in the meantime,

borrow money and pay high interest on it during that time. I think it is not right, and as for myself I am not going to do it as long as the customer has money and there is any way I can get at him. I just go to him and tell him that I am in need myself as well as he, and if there is any interest I think it proper for him to pay it.

that can and will dig down and get more out of the business. I maintain that there is more in the way a smith runs his business than there is in the amount of business he does. It is a tedious business that is merely business and work. I wish that the craft would come closer together, "get wise" to themselves and realize that they are a very important part of the world's machinery, and profit thereby.

D. W. MURPHREE, Texas.

An Interesting Letter from California.—THE AMERICAN BLACKSMITH is all that could be desired for price of subscription and "then some." I find every issue entertaining, even to the advertisements, and when one takes into consideration the various branches of work which come to the smith I think your paper covers a-plenty in each issue.

I have been in the business nearly 28 years and am learning all the time, and must say that I have gotten many a valuable kink out of our paper. I am pleased to say that I have made a success of the business and of the "kinks" which I have read. If "the boys" would digest some of the articles which have appeared in the paper on business management it would certainly be a great benefit to them. When one just hammers away and pays no attention to cost or the many small leaks, how can one ever expect to get any farther ahead than just making a living? To be sure, there is too much competition from the "Tom Tardys," but if one will figure out how to do a job, and then get at it, the work can be done in from 25% to 50% less time, and thereby make a good profit in that way. By planning the work beforehand I think one can do a certain amount in a given time and with less effort. In other words, I find that to be a successful smith you must use your brains in connection with plenty of power and other small tools, with a good assortment of stock. I believe any smith can succeed who will follow these simple rules of reason and judgment. Let his motto be "quality not quantity," and in using his brains he can deliver both these essentials to his own profit.

I do general work and auto-repairing, and find the articles in "Our Paper" on auto-repairing very instructive.

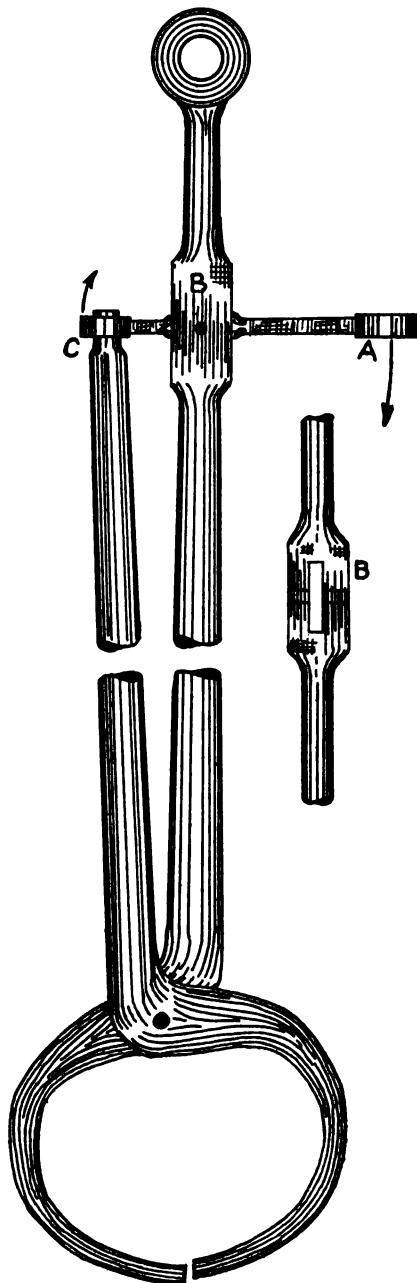
Did you ever try a little oil when cutting tenons on heavy spokes? It saves time and perspiration.

When you have an order for a half dozen rigs do you ever try making the separate parts of each kind at one time, such as cutting, rolling and welding all of the tires at once, etc? If not, just try it next time and notice how much time you can save.

I carry no side lines of any kind, as I have not the time to waste on "shopping buyers," but I do act as buyer for the farmers in purchasing vehicles and farm implements. The commission is good and it is not necessary to invest any money.

W. G. WISE, California.

A California Shop Electrically Equipped.—My shop is built of corrugated galvanized iron. The blacksmith and woodwork department is 50 by 60 feet, and the auto-repair shop is 30 by 50 feet. It is floored with 1 by 12-inch lumber and doubled so that there are no cracks for tools and supplies to fall through. My equipment consists of three forges with electric blowers and the necessary anvils and tools; a hand drill press; a large Barnes power drill press; a bandsaw; a power hammer; an engine lathe; one large emery grinder for plows and heavy grinding; two small emery grinders for tools and small work; a large number of socket and other wrenches of various shapes; a set of blacksmith dies, from 1/4 inch to 1 inch; standard dies and taps, from 1/8 to



WEIGHT DROPPING DEVICE—
SUGGESTED BY MR. POPE

I am at present without a blacksmith, except my son who is fifteen. Good blacksmiths are becoming very scarce in this part of the country, and the worst of it is that there are so few learning the trade. It seems there is so little encouragement for a young man to learn. The little shops are set about over the country, and all they know is to try to cut the price and catch a job of some kind, regardless of profit. The thing with them is to get the job. I maintain that a good job is a much better advertisement than one cheap in price, as the one cheap in price is generally cheap in quality. What we want is more thoroughbred smiths



$\frac{3}{8}$ inch; a lot of machine screw dies and taps; one set of A. L. A. M. dies and taps, from $\frac{1}{8}$ to 1 inch; standard pin reamers up to No. 6; machine reamers up to 2 inches, and drills from $\frac{1}{8}$ to $1\frac{1}{4}$. One of the handiest tools I have is an electric breast drill that will handle drills up to $\frac{1}{2}$ inch. I have a large hand-power shear for cutting iron and steel 1 inch round or square, and $\frac{1}{2}$ by 14 inches in flats. I have numerous small tools for various purposes.

I do almost all kinds of work, but at present I am doing no shoeing. I build well-drilling rigs and make well tools of different designs and for different formations. I have recently made and shipped to Arizona a \$1,650 rig. I do a great deal of special work that I may describe at some future time.

I notice that one brother smith has inquired about gas engine and electric power. I have tried both, but do not claim to be an authority. If I were he I would not be bothered with a gas engine if I could get the "juice." I have a small electric motor for the blower; a three H. P. motor for the bandsaw, power drill, lathe and small grinders; another three H. P. for the hammer and large grinders; a $\frac{1}{2}$ H. P. that I run the drill with on special work. I pay eight cents per K. W. hour for current, which is quite high for power, but hired help at three or four dollars per day is still higher. And as for sweating and fuming over a balky old gas engine I would rather pay ten cents per K. W. hour for electricity than be bothered with a gas machine. I prefer several small motors to one large one. Where power is measured by a meter it costs money to run shafting and belts. I run about two or three machines with each motor. My shop is lighted with electricity, and power and lights run to about ten dollars per month. Of course the current is off when the machine is not in use—the expense stops when you pull the switch.

I. M. TOWNSEND, California.



The Automobile Repairman

One of the most commonly neglected parts of a car, so far as lubrication is concerned, is the clutch operating mechanism. In the case of some multiple disc clutches, which are enclosed in oil tight cases, the oiling of the thrust collar and the lever which operates it is automatic, but in the case of many cone clutches, and, in fact, all that do not operate in an oil bath, the thrust collar and lever require oiling by hand. The duty of these parts is very severe, they being almost constantly in use in throwing in and out the clutch. Very frequent lubrication of the ball thrust bear-

ing and of the end of the lever which actuates it is thus demanded. Not only so, but the bearing of the clutch pedal and the pins which secure together the clutch operating linkage should be frequently supplied with oil.

If the engine fails to work regularly, first ascertain if your spark is all right by taking out the spark plug and placing the metal of the plug on the metal of the engine with the wire connected to the plug. Then (with your switch on) turn your engine over slowly until you see a spark between points on the plug. If your buzzer works and you fail to get a spark, your plug is short circuited, in which case you had better put in a clean plug and have the old one cleaned and repaired. If your buzzer does not work, then you will probably find a loose connection (or broken one) in your battery box. If your buzzer works freely, your batteries may be weak or your coil needs adjusting. Turn the screw one way or the other until you get the best sound at the buzzer. This should be between a sharp and a very coarse buzz. A too coarse buzz will cause missing on high speed and a too light buzz will refuse to work, and quit on you at times when most wanted. It will also have a tendency to burn the platinum points on the adjusting screw and on the buzzer. If your coil needs frequent adjusting, then your batteries are becoming weak and should be replaced. The points on the plug should be about 1-32 of an inch apart for best results, although you might not notice any difference until your batteries begin to get weak.

The hub brake mechanism is a part of the car which seldom receives the lubrication it should, for in some cases it is far from accessible. Oil is required on the pins supporting the brake shoes and upon the bearing points of the cams or toggle mechanism which actuates the brakes. These parts usually depend for their lubrication entirely upon the use of the oil-can, and as they see hard service they deserve good attention in this regard. Beginning at the operating lever, every joint in the brake rods occasionally requires oil, as do the bearings of the compensating shaft.

Remagnetizing Magneto Magnets. The remagnetizing of magneto magnets is generally left to the maker of the instrument, and that is, perhaps, the best plan, as the manufacturer has special equipment for the work. However, a method of remagnetizing is given in the Commercial Motor, and the repairman contributing the suggestion was awarded first prize by that publication. The apparatus and wiring diagram are shown in an accompanying illustration, and it will be noted that two storage batteries are utilized, also two bulbs.

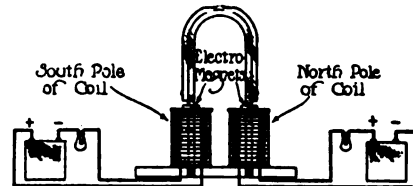
To make the apparatus, two pieces of soft iron are employed, about 6 inches long and about 1.25 inches in diameter. These are used for the cores. The base is constructed of a piece of mild steel plate in which are tapped two .5-inch holes and these are threaded to take one end of the iron core.

Before screwing the core pieces in position, they are wound with an equal number of turns of No. 22 gauge insulated copper wire, the ends being left free. To these are attached four terminals. The wires are connected up to a pair of storage batteries as shown, and the latter are so wired that the polarity of the soft iron cores, indicated by the compass needle, is North and South respectively.

The inventor of the apparatus states that should the coils show signs of overheating, one or more lamps should be placed in each circuit to introduce resistance. Before beginning the work it is essential to ascertain

the polarity, and this is accomplished by the aid of a compass needle. The magneto magnets must next be marked North and South, respectively, before there is any opportunity of reversing the process by confusing the poles.

To use the apparatus it is stated that it is only necessary to place the magnets with



HOW MAGNETO MAGNETS ARE REMAGNETIZED

their opposite poles in contact with the cores, until they have absorbed sufficient magnetism to enable them to sustain a weight of 10 pounds, after which they are ready to be replaced on the magneto. In the drawing, the magnet to be treated is the inner member.

"Never be without it." The list of things a blacksmith should "never be without" is probably as long as the inventory of furniture and ancestors that "came over in the Mayflower." Some there are, however, who can "make a little go a long way" in emergencies. They are like the man of whom it was said "Give him a fence rail and a wire hair pin and he'll bring any car home." Even such a man will find our own pet "cure-alls," copper wire and rubber tubing, of help in many cases. The list of things that cannot be done with these first aids is shorter than the list of those that can. Copper wire will do almost anything but inflate the tires. With rubber tubing, broken gasoline pipes can be mended, worn spots in insulated wire may be covered up, a lamp detached from its bracket for portable use may be supplied with gas to give light for some repairs at night, new washers may be made for the valve caps or pump, and any of a large number of things may be done. "Never be without it."

The oil in the gear box, in time, becomes impregnated with fine particles of metal, caused by wear on the gear wheels. The quantity of this will be abnormal if the driver is not skillful in changing gears, and allows them to grind when going into engagement. As these particles of metal act as a splendid abrasive or cutting compound, the necessity will readily be seen of frequently cleaning out the gear box and substituting clean, fresh oil.

To stop the rattling of box lids. Probably the most satisfactory way, all things considered, in which to prevent the lids of battery and tool boxes which are carried on the running board from rattling is to fit them with screw fastenings. Two thumb screws should be used for each lid and these should pass through the lid screwing into brass sockets securely into the sides of the box. The difficulty with strap fastenings is that straps are likely to stretch to just such an extent that it is not possible to draw them tight across the covers without punching new holes so near the old ones as to make it likely that the buckles will pull through. In the case of a strap which has stretched to this extent, an expedient which may be employed is to make use of a piece of strong rubber tubing such as is used for the water circulating system and to place this under the strap before the latter is drawn tight. In place of the rubber tubing a piece of an old inner tube three or four



inches long may be rolled up and placed beneath the strap.

When an engine is taken down for its annual overhauling, notice should be taken whether the various brasses are pegged to prevent them from turning, or whether they are merely a tight driving fit in an aluminum boss. Both methods have advantages of their own in the event of the

An occasional glance under the car, when it is at rest, with the engine stopped and the gasoline still turned on, may prove profitable. The fuel tank should also be occasionally inspected to see whether it has become leaky, through the opening of its seams by vibration, or whether the union connecting the pipe to the tank is leaking or not. The gasoline pipe should also be

This allowed the mixture to be weakened to such an extent that it could not be fired; but upon the insertion of a gasket at this point the engine started readily. The other instance was a case of overheating of an engine that had but recently been reassembled. In this case also much time was lost in locating the trouble, it finally developing that one of the boys who had worked upon the engine had cut new rubber gaskets for the water outlet pipes, but had failed to cut holes through them for the passage of the water.

In fitting a speedometer or mileage-indicator to a car it is absolutely necessary to have the driving gears, which are mounted on one of the road wheels, exactly centered on the latter, otherwise the gears will wear quickly and will also be noisy. Occasionally the gear is mounted eccentrically in regard to the bearing center of the wheel, with the result that during part of the revolution the teeth are fully in mesh, and during the rest only the edges are engaged. If the center of the hub cannot readily be found, then the inside of the rim can be used, taking care to have all points on the circumference of the gear equidistant from the rim.

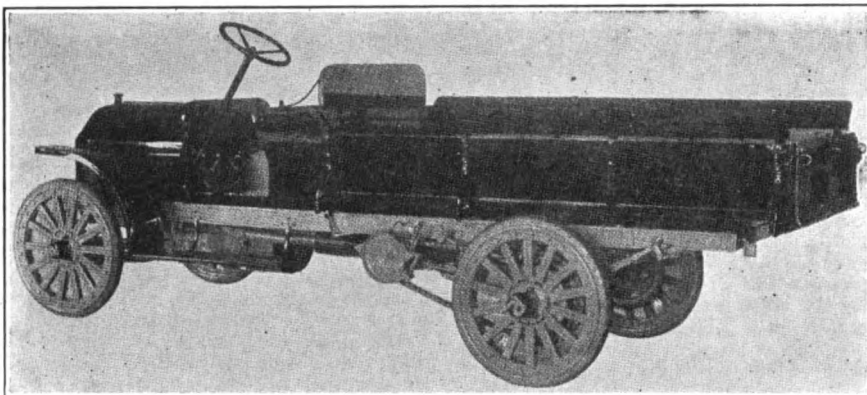
When the rubber matting on motor cars has been in use for a time its uniform color disappears, the oil and grease collecting upon it from boots and by dripping tending to rot and discolor it. To prevent the destruction and discoloration the matting should be painted with lead colored paint, which, when dry, gives a varnished surface. Not only is this oilproof, but it gives a bright look to the mat, and renders it easily cleaned by means of a cloth.

Spreading of Split Pins. One of the mistakes that are very commonly made, not only by amateurs but also by professionals, is to spread the ends of split pins too far apart, so that if it becomes necessary to remove the pins, considerable work is required in order to get the ends together. Pins that are likely to remain permanently in place may, of course, be spread to the limit; but those which may have to be occasionally removed should be spread just enough to keep them from working back through the holes, which is all that is necessary.

Some Graphite Uses. Flake graphite, when used as a tire lubricant, makes a good and easy fit of the inner tube and materially reduces heating. It is not only more lasting than soapstone, but it has no deleterious effect whatever, for graphite is chemically inert. Rims can also be treated with flake graphite as a preventive of rust. The application of a thin coat of quick drying shellac varnish, to which flake graphite has been added until the consistency is about that of thick cream, has given good results.

The threads of all bolts can well be smeared with graphite mixed in oil to a paste-like consistency when parts are assembled. This mixture should also be applied to the spark plug and valve cap threads, since it prevents rusting and corrosion and makes removal easy. If the springs squeak, introduce some flake graphite paste between the leaves with an old knife. This prevents rusting and stops squeaks.

The devising of a solution capable of dissolving accumulations of fur from a water jacket without damaging the metal, has been given a great deal of attention. There is one little known plan, however, by which a great deal of the accumulation can be removed, if tackled before it is excessive in quantity and much calloused by time. The water jacket may be connected up to a steam cock, and steam forced through at a high pressure for an hour or so, with the

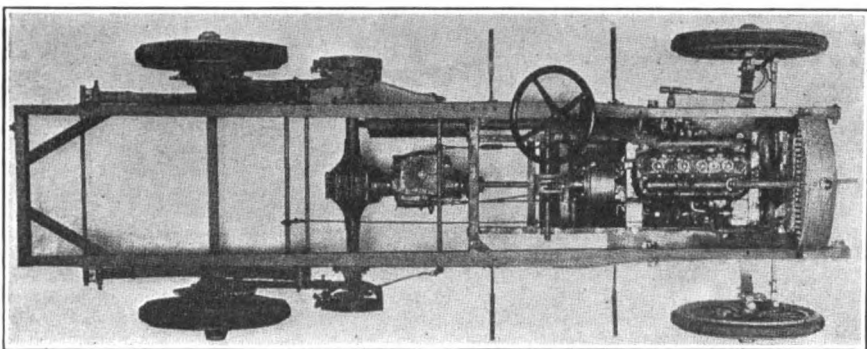


HOW THE CHASSIS APPEARS WITH A STANDARD EXPRESS BODY

lubrication failing through personal or mechanical reasons. For instance, if the brass be not pegged, and its interior circumference fail to receive lubrication, the brass will seize upon the shaft, and finally begin to revolve with it, so that damage is confined to the aluminum. Few would fail to notice what was happening before the injury had extended further than to loosen the brass slightly in the aluminum, and this could be repaired by fitting a brass of slightly larger outer circumference at small cost. On the other hand, if the brass be pegged, when a shaft seizes, the damage will be more extensive; probably either the shaft will be bent or cracked, or the crankcase split right across. On the above comparison an unpegged brass would seem to be preferable. But the unpegged brass has a special weakness of its own. Whether from shrinkage of the metal after many heatings, or from some other cause, these unpegged brasses develop a liability to twist and turn in their beds after a few thousand miles, even though the lubrication

examined for leaks, similarly the union which connects it to the carburettor float chamber. This pipe should have sufficient slack in it to prevent its being strained under any conditions, and may well comprise a coil of one or two turns, to render it flexible under the strains of service. It should not be so placed as to come in contact with any other part of the mechanism which might abrade it and in time cause a small hole. If any of the unions are found to leak they should be disconnected, the ground surfaces wiped perfectly clean and given a coating of white soap, which will be found to stop slight leaks. If, however, this expedient is ineffectual, the bearing surface will have to be ground in with fine emery and rouge or whiting. Finally, we may add that the soldered connections of the gasoline pipe to its unions will bear watching from time to time.

In replacing gaskets, after some of the piping has been removed for any purpose, care should be taken. Two incidents will serve to illustrate the importance of giving



THE CHASSIS, STRIPPED, READY FOR THE NEW EXPRESS BODY

be perfectly maintained. The instant they begin to turn, however slightly, the circular oilhole in the brass which feeds the V-groove running along the shaft with oil gets out of register with the corresponding channel drilled through the aluminum boss holding the brass, and consequently the bearing runs dry of oil, and seizure, partial or complete follows as a matter of course.

proper attention in this direction. In the first case, a recently overhauled engine refused to fire. Everything was in order, apparently, and yet no amount of coaxing would persuade the engine to start. After much fussing and after many things had been tried, it was found that a gasket had been omitted from one of the flanges where the intake pipe was secured to the cylinders.



other union left open. The subsequent running of the engine will show a vast improvement, though the whole of the scale will not have been driven out. The same method is applicable to gilled tube radiators, but would be risky if used on those of the honeycomb variety.

In Filling Radiators. As considerable time is required for the water to pass down through some radiators, in which the passages are small, it is well, after the water has overflowed at the cap in filling, to turn the motor by hand a few times and then try if more water can be added. If the radiator really is not filled when the first overflowing takes place, overheating may result.

If difficulty is found in causing a bolt holding together two parts to fit their holes with ease, the chances are that the two pieces are displaced angularly, and it should not be attempted to put the bolt in place by brute force. The condition should be examined and rectified if found wrong. A great many bolts and studs and their nuts are damaged by carelessness in starting the nuts cross threaded, and then using a wrench forcibly to turn them on. Nuts should be started carefully with the fingers and one should be certain that the threads "take" properly.

Cleaning Brass Parts with Emery. Some of the brasswork of a car, because of its position and the work which it has to do, is apt to get into a rough state and to be difficult to keep clean. This applies particularly to the brass strip edging to the running footboards and the footplates on the door sills. It is sometimes difficult to clean these with a polishing fluid, the latter having a knack of staining the surrounding varnished woodwork or the rubber footboard covering. As a consequence, one often sees these parts unpolished—which means discolored. It is far better to abandon the idea of cleaning them with polishes, and to use the finest emery cloth, a piece that has already seen service on other work and has lost some of its "cut" being best suited to the purpose. New, or unused, emery cloth should never be employed.

Converting Used Pleasure Cars into Trucks

G. D. CRAIN, JR.

The man who may be counted upon to make a pretty fair success of the line of work he follows is the one who manages to keep up with the procession, if not a jump or two ahead of it.

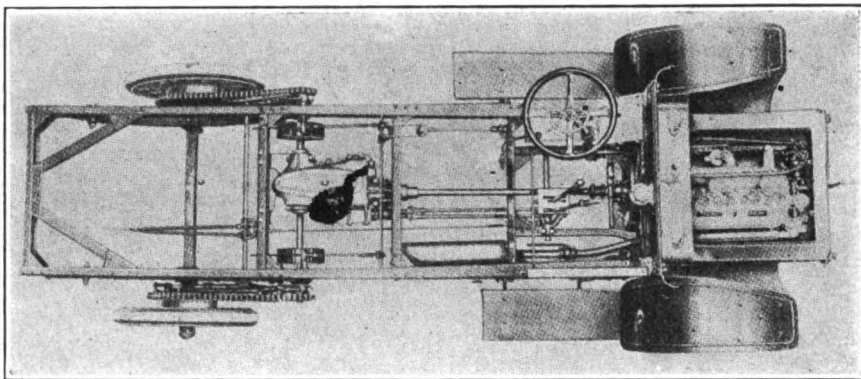
Applying this not entirely new view to some conditions which may be observed at present in some of the larger cities and towns among the blacksmiths, a close observer will wonder why many smiths are handling only the same old business which their grandfathers in the trade handled in a past generation, while others have been able to find much good business in taking hold of an entirely new line, which is, after all, only a modification of an old one.

Any shop which can turn out a creditable wagon body can make an equally creditable motor truck body,

if he will only take the trouble to learn the few essential differences between the two; and one of the essential differences between them is that it bears substantially larger profits. This should constitute something of an inducement, at least. Not neces-

this reason. The truck body business grows out of the fact that many makers sell the engine and running gear (the chassis), and the purchaser then has a special body built to his order.

Another phase of the business, and



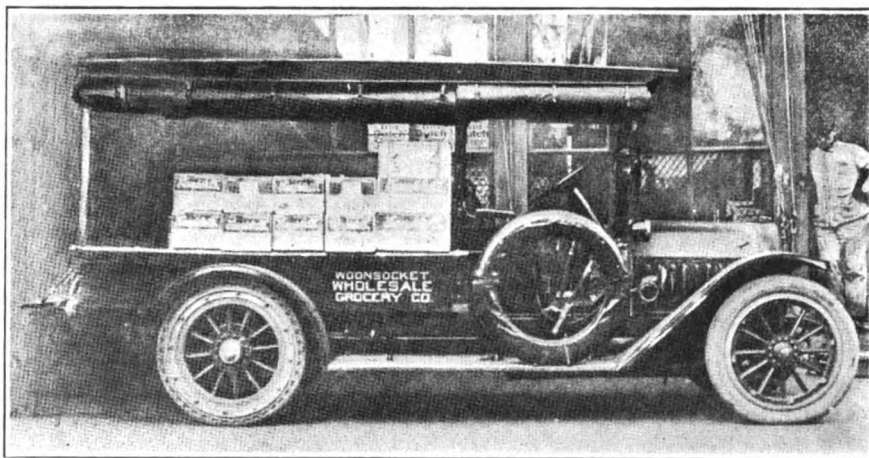
A ONE-TON CHASSIS READY TO BE FITTED WITH BODY AND PROTECTIVE TOP

sarily to cut away from the wagon business, by any means, but to get some of the rapidly increasing motor truck business which is growing up in every part of the country.

The business of building bodies for motor trucks grows out of a slightly different state than that of making wagon bodies, as far as the man in the shop is concerned, and its development to a profitable business will very likely call for a little selling work on the part of the wagonmaker.

The man who wants a new bed put

an important one, is the conversion of old passenger cars into commercial vehicles. Up to a few years ago this sort of thing was not done; but, now enterprising business men have found that expert wagonmakers can take a used passenger automobile and turn it into a serviceable truck for certain purposes at comparatively little cost. For the owner of the shop which is able to do good wagonwork this furnishes a much wider field than is possible to the shop which does not reach out for new and desirable busi-



A POPULAR TYPE OF DELIVERY BODY FOR SEMI-HEAVY GOODS

on his wagon is moved by that desire because the old bed has worn out or, perhaps, because he wants a larger or different type of bed. Comparatively little business in truck-building will come to a shop, however, for

ness. And the very low prices at which used passenger automobiles can be had is the secret of the whole matter.

"Of course it requires a little special knowledge to build an auto



truck body, just as it does to do anything else," said a blacksmith who has specialized, to a certain extent, in this kind of work. "For instance, you have to build a frame to fit the chassis before you begin on the body at all. This is not done in building a

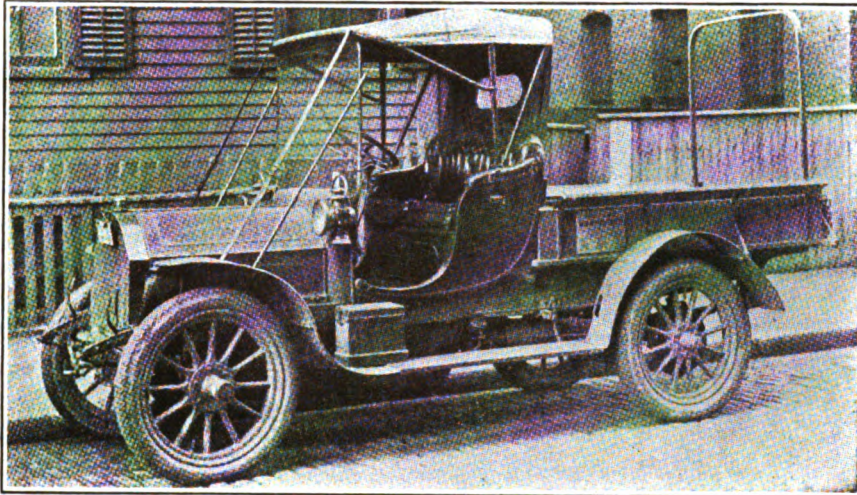
motor truck, even on the modest scale indicated by the use of a second-hand chassis, is willing to pay for the necessary work of putting on the kind of body he wants.

This is a rather important point, too, for unless there were greater

whole matter. It is the most concrete instance possible of the reason why the blacksmith should keep up with the procession. The motor vehicle is one of the newest and most characteristic things of this age; and, as suggested, it touches the blacksmith and wagonmaker very closely. It is gradually making inroads on the horse and horse-drawn vehicle and in many instances it is hurting the business of the blacksmith.

In order to get his share of this business—that of converting passenger automobiles into serviceable trucks—it is not by any means necessary for the blacksmith to try the somewhat hazardous experiment of going into the business of making trucks of cars which he has bought up for the purpose. A hint here and there is about all that is necessary—just let people know that your shop can and does handle that kind of business.

"We lost a nice piece of business in truck body building, recently," said the smith above quoted, "all because one of our best customers didn't know that we did that kind of work. I don't know how it happened that he didn't know; but he gave an order for four bodies to another shop. He changed over his entire delivery system to motors, using four second-hand passenger cars for the purpose; and we lost a fine piece of work, at



A PIERCE-ARROW CAR CONVERTED FOR USE AS A LIGHT EXPRESS TRUCK

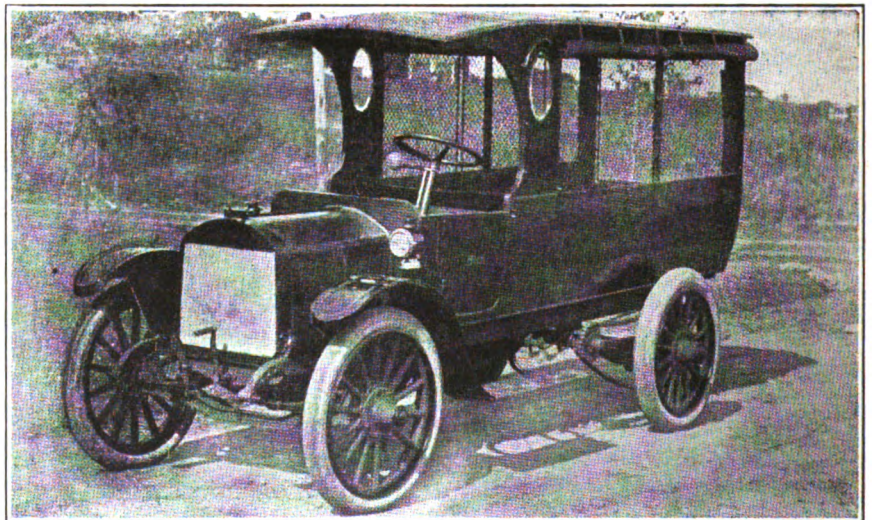
wagon body; but while this takes several days it is a necessary part of the job and, naturally, is charged for accordingly.

"That means, on the other hand that a correspondingly larger profit goes with it, if the charge is properly proportioned to the cost of the work. And this is one of the features of truck body work which makes it so well worth handling—it stands a much better price, in proportion, than does wagon work.

"If you charge a man \$150, say, for building a new body for his wagon, he is inclined to object pretty strongly, because he can get a new wagon for a little more than that—not hand-built, perhaps, but still a new wagon. But a man rather expects to pay a good stiff price for a motor truck, even where it is built up on a second-hand passenger chassis, and in my experience we have had very little trouble about getting our price for such work."

For the blacksmith who has found it necessary to be continually on the aggressive or, rather, on the defensive, in order to sustain his fair and reasonable charges for a long and costly piece of wagon work, this comes as something of an eye-opener; but it is logical enough. It is an indisputable fact that a man who has braced himself to stand the expense of a

profit in the work than in ordinary wagonmaking, it would hardly be worth while to go after it, save to fill in with. It is worth considering, however, that while the horse has not yet been very materially displaced by the motor truck, the latter is gaining. And in order to hold his own it is emphatically up to the blacksmith



A POPULAR DELIVERY BODY FOR GROCERS AND DRYGOODS MERCHANTS

to replace with motor business that which he loses where a delivery system is changed to the motor-driven vehicle.

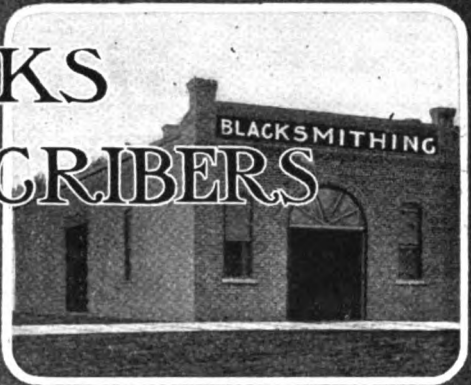
In fact, this is the real point of the

the same time, although I can't see just where it was our fault."

All of which goes to show that it pays to advertise. If you do auto-work, let people know it.



TIMELY TALKS WITH OUR SUBSCRIBERS



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About Learning the Trade

Mr. G. A. Gleason—a New Hampshire veteran—says: "I am 80 years old and have worked at blacksmithing over 60 years, and do pretty good work now."

It takes a man of years of service to tell how long before one knows the trade. The apprentice and novice is the only one to remark how easily and quickly the trade can be learned. The veteran, the man who has controlled the blast and has pounded on the anvil for years, knows that a lifetime is none too long an apprenticeship. The veteran knows that years of service enable a man to "do pretty good work."

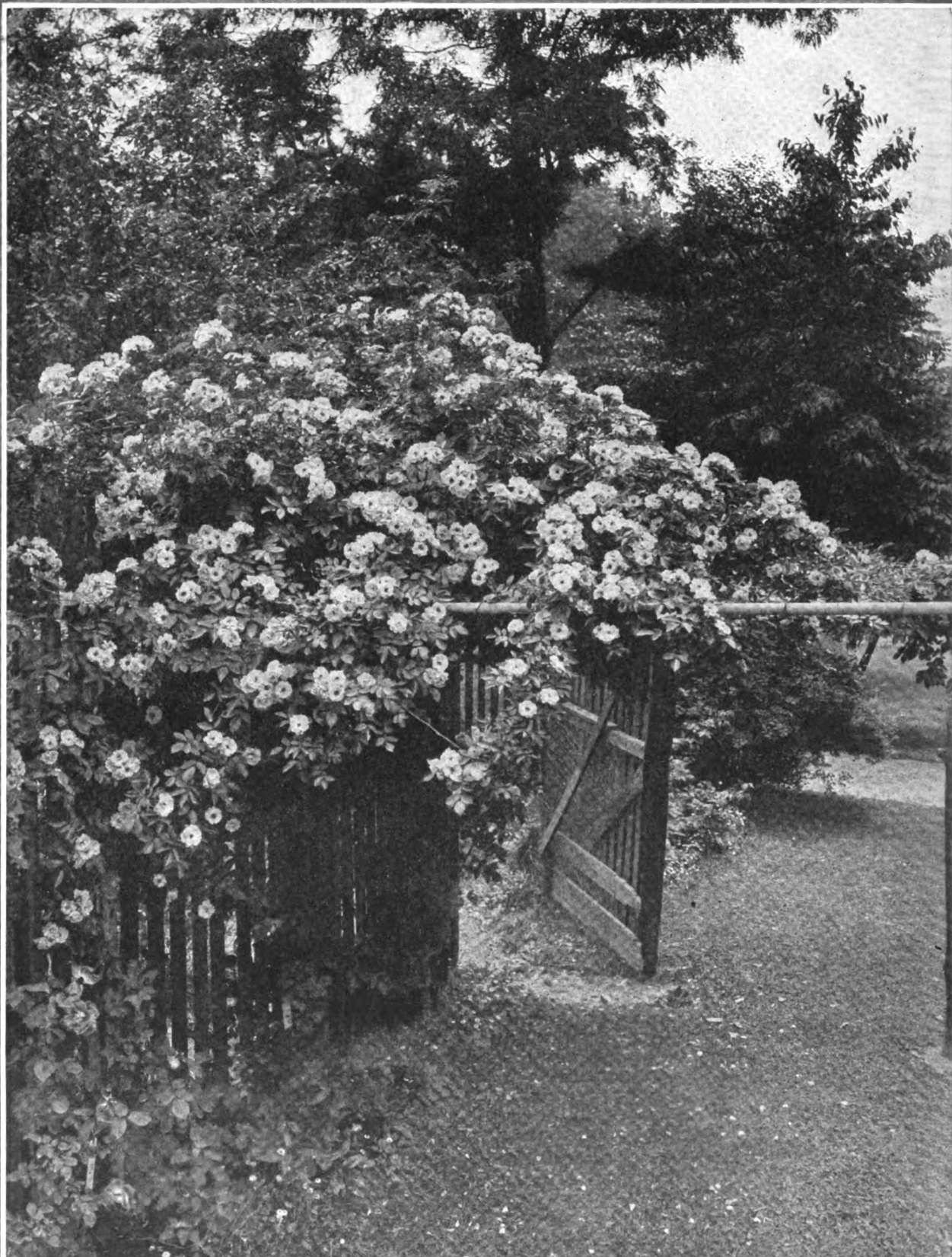
A man cannot know too much about smithing. Twice the allotted "three-score-and-ten" is none too long to learn the trade. Time and again do the veterans say: "Well, that's a new one to me." And as they talk to their fellow craftsmen, read their trade journal and reply to queries, they continue to build a sound, solid structure on their foundation of experience.

And this suggests the query: "Where would you be today if you depended solely and only on your own knowledge and efforts?" What progress, what advancement, what success could you make in your trade, THE trade of the centuries, if you depended upon your own individual efforts alone? Do you think a man working alone for ten times the ordinary lifetime could possibly think out and work out the innumerable ideas suggested and discovered by the thousands of craftsmen all over the world?

This is the real, solid foundation to the craft journal's mission. This is the basic idea. And we believe that THE AMERICAN BLACKSMITH is filling its mission and doing its true work well. What has been your experience? Tell us how "Our Journal" has helped you.

The Next Number

The next issue will be Our Annual Shop Number—the number for which all shop owners seem to wait—with its page after page of shop pictures, its descriptions of equipments and its almost endless list of shop hints and kinks. You'll want to read every word of the Shop Number. You'll want to see every picture, study every plan and consider every suggestion. You will find its twenty-six pages (to say nothing of the advertising section) heaped full to overflowing with new ideas. Don't miss it.



AWAITING THE WEARY TOILER WITH A FRAGRANT WELCOME



Boxing Carriage and Wagon Wheels

A. C. GOUGH, M.E.

IN the good old days of the tar axle it was not very difficult to prepare, by hand, the hub for receiving the boxes and to set them securely by means of wooden wedges. This is true only because the wheel boxes were mere, short, thick, cast-iron bands set into the ends of the hub, which required the removal of only a small amount of material from the interior of the hub, and these boxes could easily be set to make the wheel run true by driving wedges around them into the hub. Upon the introduction of the thimble skein this method never proved quite satisfactory.

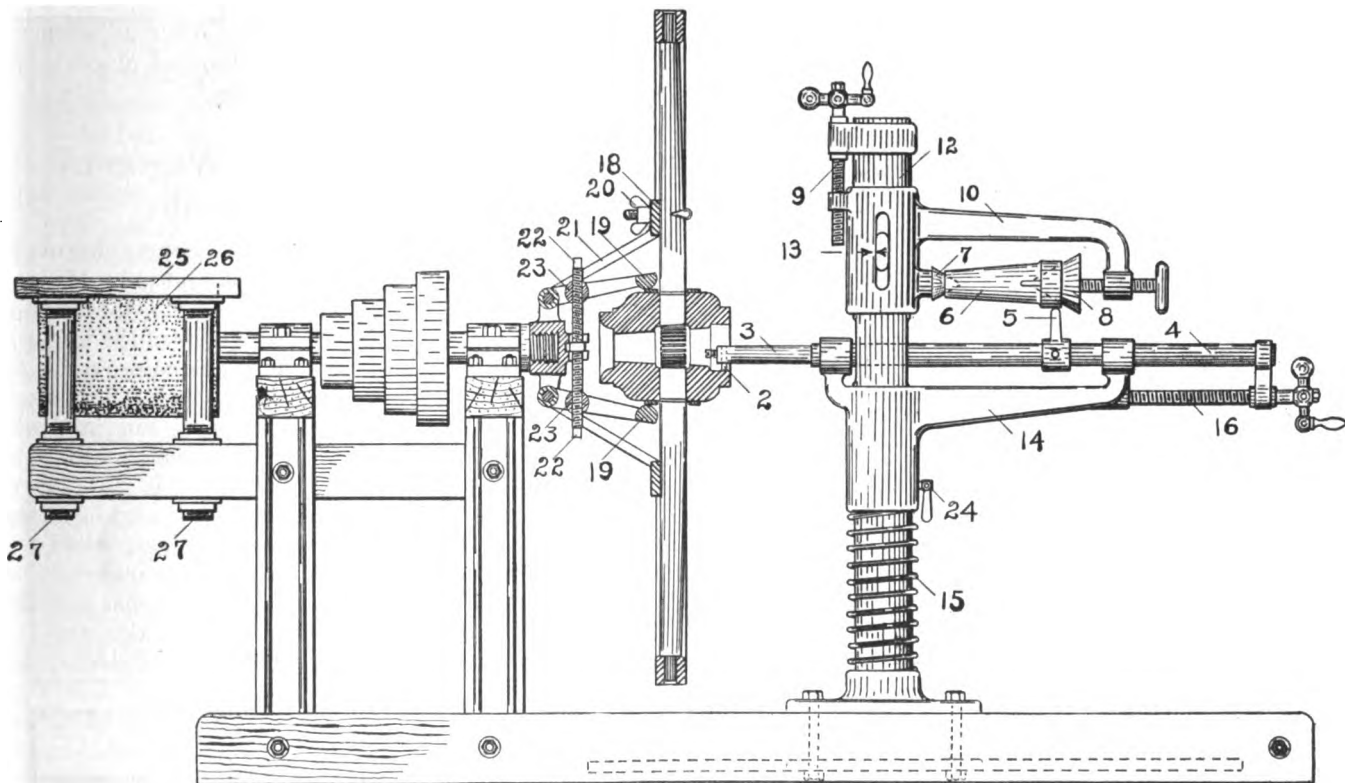
Except a small portion immediately under the spokes, the thimble (usually called the wheel box at this time) should have a bearing—a driving fit—throughout the hub. Unfortunately, it is almost impossible to obtain this condition when

setting the boxes with the usual hand tools employed in the method referred to. Plugging up the ends of the hub, finding the center, measuring the box, laying off with the dividers, cutting the recess for the shoulder of the box and removing the surplus material with the gouge, all go to make this a tedious operation; but the worst is yet to come. Though the mechanic be accurate and painstaking enough to remove the proper amount of material (making the proper recess under the spokes that will allow a nice driving fit), the box will most probably not be true with the wheel when it is driven or pressed into the hub. Of course there are many good mechanics who can remove the box, take out a little more material, replace the box and wedge it over until it is almost exactly true with the wheel. This might appear very easy to the un-

initiated; but the writer has noticed that the workman usually wears a broad smile when the box shows true with the wheel.

It is really quite an art to wedge the box in properly; rather, to wedge the box in the best manner, because the hub should really be prepared to receive the box in a way that would not require any wedges. For when the box requires to be wedged in at one side, then upon that side it has a bearing only at the extreme ends; which condition is not at all desirable, as constant heavy loads will crush this small bearing surface and, if the box does not become loose enough to fall out of the hub, the lubricant may enter between the box and hub (soaking into the ends of the spokes), which condition quickly ends the usefulness of the wheel.

The writer has seen several handmade wagons that stood up under



A COMBINED DRUM AND DISC-SANDER, FACE-PLATE LATHE AND HUB-BORING MACHINE FOR THE WAGON SHOP



hard service for many years. However, this is not considered as proof of the superiority of this method, but rather a tribute of honor to the mechanic whose skill made it possible. While no doubt exists that there are many mechanics whose ideals are so high they will always do a pretty good job, regardless of any handicap, nothing can refute the fact that the best way to provide for mechanical difficulties is to fix it so the difficulty cannot happen.

The machine design shown here is not the first worked out by a large number. The principal idea in the study of a new design for a hub boring machine was to produce a machine which would employ the box to be fitted as the guide for the boring tool, and to have the tool revolve; the wheel being clamped solidly to a stationary support. In developing this idea the parts supporting the revolving tool became so complicated that the modification shown here is considered more practical.

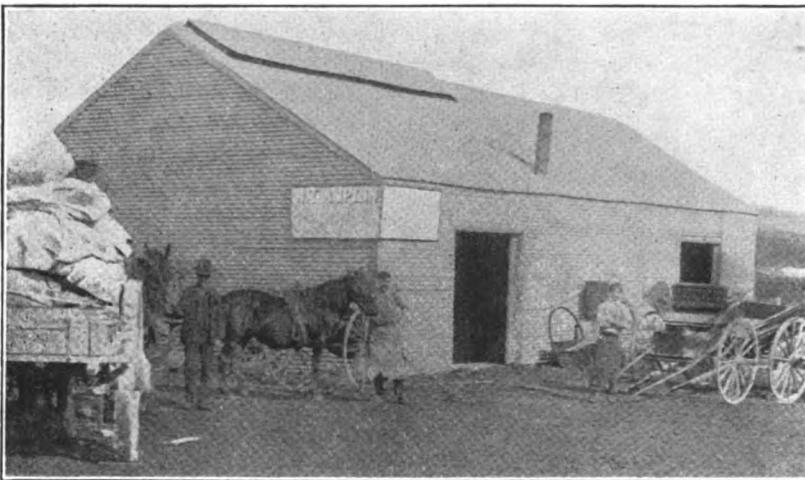
Combination tools and machines are not usually satisfactory. However, combinations of machines that

the table 25, which may be supported and adjusted by the four wrought-iron pipes, 27. Of course it is evident that to convert the machine into a face-plate lathe it is only necessary to remove the special wheel chuck, 18, and screw the face plate upon the spindle. The lathe rest necessary to use in this connection may also be used with a tool for truing the tread and face of the wheel rim. The machine may be converted into a disc sander, by screwing the disc carrying the abrading material upon the spindle, and providing a suitable table secured to and supported by the main frame.

To use as a boring machine, the wheel is clamped upon the wheel chuck, 18, by three or more screw hooks, (shown at 20), the wheel being centered by the arms, 19, each of which have V-shaped ends for clamping the hub. The arms, 19, are actuated by a right and left hand screw which is retained in the proper position by the means shown at its middle and has two square ends, 22, provided for the use of a chuck wrench. The two parts, 23, swivel to allow the arms,

14; the spring, 15, having sufficient compression to support the weight of these parts and hold the finger, 5, against the wheel box, 6.

The machine only needs one adjustment; that being when it is made. This may be done as follows: Take any wheel box, 6, that is in fair condition, and secure it firmly between the smoothly finished cones, 7 and 8; lower the part, 10, by means of the screw, 9, until the arrow, 13, corresponds with the other arrow which marks the lower limit of vertical movement. The cutter, 2, may next be set with just the desired amount extending outside of shank, 3. A thin metal or any suitable gauge should be provided for setting this cutter, so that it may always be set exactly the same. Now a hub is secured by the chuck, 18, and the lowest point of cutter marked upon it, then turning the hub through one half a revolution, again mark the position of the lowest edge of the cutter. One half of the difference of the distance between these two marks and the diameter of the box used will be roughly the amount to remove from the guide finger, 5. Care should be taken not to remove too much from the guide finger, 5. The adjustment may be finished by using the calipers to obtain the exact size in the first bore, and filing off the end of 5 until 13 corresponds with the other arrow. After adjustment has been made, the end of guide, 5, should be hardened.



THE SHOP OF MR. W. T. ASPLIN OF NEW ZEALAND

are not used regularly may be both efficient and economical; especially in the repair shop. The machine shown in the figure may be a combined drum and disc sander, face-plate lathe and hub-boring machine. Where the shop already possesses a good sized face-plate lathe or disc sander, the hub-boring part may be attached.

The sander drum may be of any form; the one shown at 26 may be used as a table sander by attaching

19, to be adjusted for small and large hubs. The column, 12, supports the other parts of the boring machine.

The box, 6, which is to be fitted, is secured by the two cones, 7 and 8, as shown, which hold the axis of the box always parallel to the spindle, 3-4. The part, 10, which carries the cones, 7 and 8, may be raised or lowered by the screw, 9. The shank, 3, spindle, 4, and traveling screw, 16, are carried by bracket,

A Large Wagon of Australia

The accompanying engraving made from a photograph sent in by Messrs. Hart & Jorgensen of Queensland, Australia (the builders of the wagon), shows a vehicle of large proportions. We are indebted to Hart & Jorgensen for the dimensions of this immense wagon, which are given as follows: The length over all is 26½ feet; width, 9½ feet. The back wheels are 7 feet 2 inches in height, while the front wheels are 5 feet 8 inches. The tires have a face of 7 inches and are 1½ inch thick. The axles are 3½ inches square and are of steel. The naves, as they call hubs in Australia, are 18 inches in diameter by 15 inches. The spokes are square dressed and are 5 by 2½ inches in section, while the felloes are 7 inches by 5 inches. The



summers, which presumably are the sills, are cut from 16 by 3-inch, while the "beds, packing and bolsters" are 9 by 7 and 8 by 7 inches.

These wagons are drawn by bullocks. Thirty-six are usually considered a fine-weather team, while any number up to fifty are required in the wet season. "And," say the builders, "remember the animals are real bullocks not poddy calves." This wagon itself weighs four tons and has a capacity of 17 tons. It is employed in transporting wool from the Cooper River into Chorleville, a distance of 274 miles. The union rate at present is one shilling (\$.24½) per ton per mile. The cost of the wagon was £145 (\$705.67).

NOTE:—At the above rate, merely for bringing the wool the distance of 274 miles, and if the wagon were loaded to its fullest capacity, i. e., 17 tons—it would cost \$1,133.45 in American money. This to our American ideas seems a prohibitive cost.

Crooked Wheels*

E. S. MILLS

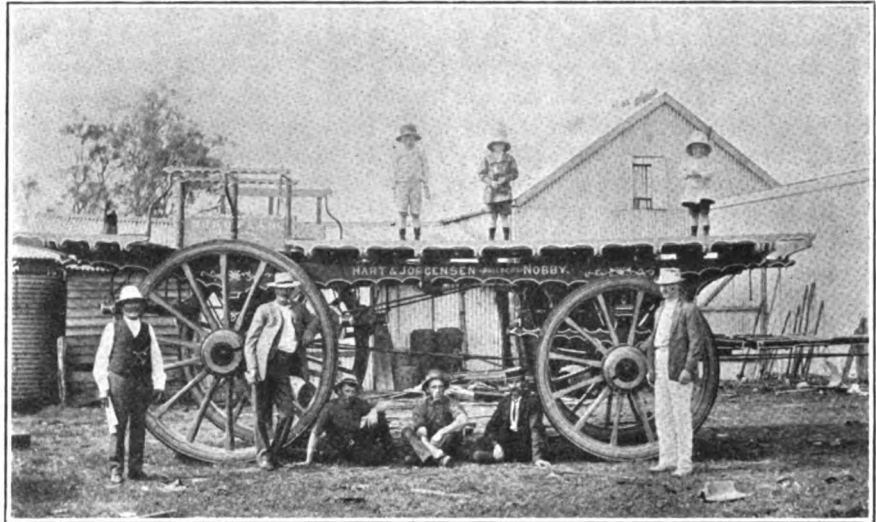
There is probably no expression which carries as much or as vivid a meaning to a wheel or buggy manufacturer as "A Crooked Wheel." It is a disputed question whether the trouble is becoming worse with the application of new methods and appliances or whether the manufacturer of today is more critical than his predecessor. Suffice it to say that it is the bone of constant contention between the user of the vehicle and the vehicle maker.

The question which naturally arises is: What is the cause? In reply it can be said that generally it is the direct result of no one cause but rather a combination of causes; which when tending to enhance each other will cause a wheel to run perceptibly crooked. However, when one counteracts or offsets the other the wheel will run true enough for all practical purposes.

Can a vehicle wheel be made to run absolutely true? Yes, but to use the words of Rudyard Kipling, "You can never tell 'til you try them." On the face of it this may appear to signify crudeness on the part of the manufacturer. However, let a per-

son make a careful and comprehensive study of the subject and the fact is brought most emphatically home, that with the wide variation in the strength or toughness in timber, even in the two ends of a spoke billet, it is a difficult proposition to build a wheel which is symmetrical

flange, rather than the hole. When the wheel is bored for the axle box it is centered in one of two ways, either from the rim or the outside of the hub, and the bit passed through the hub block. Theoretically, any error in the original hole in the block should be corrected and the boring



THIS LARGE WAGON WAS MADE BY HART & JORGENSEN OF QUEENSLAND

with respect to strength. Further, a wheel is assembled or built up from pieces of timber not perpendicular to the axis of rotation, but with a certain amount of "dish" in it, thus causing more or less internal strain.

The wide variation not only in the strength of timber, but in its physical properties or characteristics has much to do with the condition of the wheel. For instance, the hub block is made from an entire cross section of a tree, and the consistency of the heart wood and sap wood, being different, will very often cause one side to be extremely hard, while the opposite side may be only ordinarily hard, or very soft. There may be a knot in the hub block which is scarcely apparent from without, or not apparently large enough to justify the culling of the block, but developing into a very hard knot on the inside. The added difficulty in this respect is that it may occur any place along the length of the block. The result is that the fluted mandrel on which the block is turned will sink much deeper into the soft side than the hard, causing the hole in the finished block to be off center. The flange is pressed on following the outside surface, the spokes are driven, cut off, and tenoned relative to the

for the box be true in the center. However, in practice it is not found that this is always the case. The tendency of the bit is to follow the original hole and sometimes even exaggerate it; that is, just as the mandrel impressed itself deeper in the soft side of the block, so the bit cuts deeper into the soft wood than the hard. In some cases this will cause the entire box to be slightly to one side, giving an eccentric motion to the wheel, or especially in the case of a knot it may set in at a slight angle with the face of the wheel, giving it a wobbly motion. Any small error at the hub is increased several times (depending on the height of the wheel) before it reaches the rim.

Again, the flange casting may be bent, but to such a small degree that it isn't apparent to the eye when inspected, yet when revolved and compared to the larger surface of the wheel it will give it a crooked appearance.

Tiring the Most Common Cause of Crooked Wheels

Tiring, which in the opinion of the writer is by far the most common cause of the so-called crooked wheel, is also in part a logical explanation of the increased trouble

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with wheels in recent years, or since the advent of the method of compressing a tire on cold, rather than the old method of expanding the tire by heating. The tire is pressed on the wheel by bringing pressure to bear on the circumference of the rim and forcing it and the spokes inward. The hub is forced upward and thus the spokes undergo a strain. For the moment much more dish is pressed into the wheel than is expected or it is desirable to have remain. However, with the method of tiring, this must necessarily be done in order to overcome the elasticity of the metal, since the elastic limit of the steel must be passed before it is possible to have the tire take on set and remain in the compressed state.

The result is that when the hub is forced upward, and in so doing

Because of the method of grading and the very principles which underlie it.

One spoke or rim strip is white in color and outwardly has the appearance of a high-grade piece of young growth hickory, but is found to be a little under weight; and it is well known that there is no better barometer as to the strength of hickory than relative weights. This fact has been utilized and thought to be true by wheel manufacturers for some time, and by the recent joint tests by the United States Government has been proven conclusively. For this reason it is put into a "D" or "E" grade wheel. The next piece of timber is of good weight, straight-grained, but is either off color or has some slight defect which will not impair its strength in the least, yet to overcome the

test. Take, for example, grade "G" white, which consisted of forty-five spokes, one inch in size, all clear and free from defects. The maximum load sustained by a spoke before first failure was 4,220 pounds, and the minimum was 1,720 pounds, or a difference of 2,500 pounds. A small defect may often appear on the surface, and in nine cases out of ten not injure the piece in the least, yet again it may develop into a very bad defect on the inside.

It is easy to see what will be the result if we get all light weight, weak spokes on one side of a wheel, while the other is composed principally of hard, tough spokes. When the wheel is compressed, the weaker spokes will bend more than the others, thus twisting the hub to one side. When the pressure is released, the hub will remain in the same relative position, while the spokes will gradually take on set, but in the meantime try to assume their normal condition, with the result that one side of the wheel is pulled over farther than the other. When such a wheel is bored for the boxing as previously stated, it is either centered from the rim or the hub. If centered from the rim it will run true at the tire, that is, the wheel will track, but the box will set at an angle with the axis of the hub and it will give the appearance of a very crooked flange when turning. When the wheel is centered from the hub it will turn true, but the rim will be out of line.

This trouble cannot be corrected by choosing spokes of equal strength, for while a man with experience in handling timber can tell to a fair degree of accuracy the comparative strength of two spokes, he cannot nor ever can tell accurately until they have been tested. This operation, it is to be regretted, renders them unfit for use in a carriage wheel. It is simply another one of the difficulties which confronts a woodworker and which, owing to the structure and nature of timber, is unavoidable.

Another source of difficulty is that when an excessive amount of dish is pressed into a wheel, it is placed on a block, one side forced down and the tire hammered; causing it to stretch sufficiently to relieve the strain and diminish the dish to the desired amount. This



THE POWER SHOP OF MR. GEORGE L. HEATH OF PENNSYLVANIA

the spokes are bent, they do not all bend or act uniformly, some of them will bend more readily or to a greater extent than others, due to their unequal strength or resilience. If the structure of the timber could be made or, if it grew absolutely uniform and homogeneous, as in the case of iron or steel, and the various parts of a wheel be cast or carbonized, according to the duty to be performed, all would be well; but it is impossible to obtain that ideal condition, and while it is within the limit of possibility, we may be justified in saying this is never the case. The inequality is more especially true and to a more marked degree in the cheaper grade of wheels. Why?

prejudice existing against it it is put into the same grade. Again, two pieces of hickory may have the same appearance and be of uniform weight; to use the hackneyed expression, be "as like as two peas," yet when subjected to a test one will be found to far exceed the other in strength. The reason isn't apparent, for the structure of the timber may not show any marked difference, yet one will stand more strain than the other. To show to what extent this is the case in spokes of the same grade a comparison of the results of the Government test may be of interest. The test consisted of subjecting a number of spokes from each grade to a compression of long column



hammering is usually confined to one fourth the circumference of the wheel. The objectionable dish is removed, but almost invariably we have a wheel that will run crooked. The inspection of a large number of wheels treated in this manner has revealed the fact that it is always the side which is hammered that is out of line. A further proof of this is that a wheel so treated can be again put on the block and the opposite side hammered, with the result that the wheel can be made to run true.

Again, a wheel may be perfectly, true and not strained in any manner during the process of tiring, but the tire have a kink or bend in it. When the wheel is passed through the tiring machine, which trues up and straightens the tire on the wheel, pressing it sideways so as to overlap the rim evenly on each side, the rim is unable to assume the short bend to conform to the tire, and is pulled to one side for some distance, thus causing it to run crooked. This can be overcome if tires are carefully straightened, yet even when care is taken a kink will sometimes pass unnoticed.

Wheels With Rubber Tires Become Crooked

Again experience has shown that a very large proportion of the wheels that are tired with rubber tires will become crooked while in use, although they may be perfectly straight when put out by the vehicle manufacturer.

All wheels, no matter how carefully they may have been seasoned before being put into service, will grow, that is, they will absorb moisture enough to make them expand.

A wheel in use tired with a flat steel will grow just as much as one tired with a rubber tire, but the steel tire, coming in contact with hard roads, being constantly pounded and affected the same as if hit with a hammer, will expand and allow the wheel to grow without forcing more dish into it, and the result is that the wheel remains straight. Just the opposite is the effect of the use of the rubber tires.

The rubber coming into contact with the roads and taking from the channel all of the causes that effect the expansion of the flat steel tire, causes the channel to remain just

where it was placed when it was put on the wheel. The result being that the wheel must take on more dish and in doing so is affected the same as when it is given the dish in the tiring process. This dish will not be taken on evenly by all the spokes, and the result is a crooked wheel, and as a rule the users of the vehicle will blame the manufacturer; claiming that the wheel was not properly seasoned or that the tire was not put on right, when the real cause is one that could not be foreseen, avoided or corrected by him before the wheel was put into service, as it did not exist.

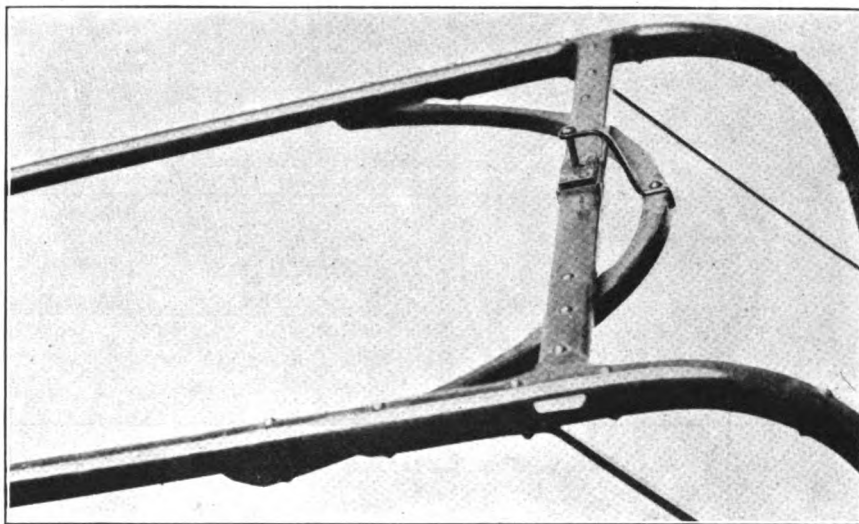
This difficulty can be anticipated and in a measure avoided by not putting the channel tire on quite as tight as you do the flat tire—a good rule is to put the channel on just tight enough to fit the rim snug all around, and depend on the expansion

feature in this respect is that there aren't more crooked wheels from this cause.

The cause without the remedy, however, is of small value. A wheel that is crooked, due to the lack of homogeneity of the hub block, can often be remedied by overhauling and replacing worn bearings on the boring machine; thus diminishing the amount of play and causing the bit to bore more nearly true, regardless of the resistance.

A bent flange can be corrected with a new one if detected in time; and with the care that is now exercised by most manufacturers this trouble is seldom excessive.

The difficulty from a crooked tire, as is readily seen, can be overcome by more vigilance on the part of the operator. The same remedy will apply, to some extent, with the trouble arising from pressing an excessive



THIS IS HOW MR. W. V. GIST OF TENNESSEE FIXES BUGGY SHAFTS TO MAKE THEM EXTRA STRONG AND LONG-WEARING. A GOOD IDEA FOR THE PRACTICAL BUGGY MAN

of the wheel after tired to give it sufficient dish. You seldom, if ever, see a loose channel tire on a wheel.

Wheels that are crooked before the tire is put on are usually caused by warping. Fully 75 per cent of the wheels sold to carriage manufacturers are without tiring, and if they are allowed to become damp and then dry out they are almost certain to warp; or if they are stacked up against the wall, one on top of another, and allowed to remain so for any length of time, the under wheels will invariably become crooked. The peculiar or rather surprising

amount of dish in a wheel and the subsequent troublesome operation of hammering it out. If, however, when too much dish is given a wheel, a machine was used that would press uniformly against the entire rim, and then the hammering continued clear around the circumference, the dish would not only be removed but the wheel kept straight.

The troubles which have their underlying principle in the variation in the physical properties of timber are very difficult to handle. The constantly diminishing supply of timber and correspondingly increased



care with which it is handled leaves a very small margin to work on before reaching the point where the cure is worse than the disease. If, however, certain prejudices on the part of users relative to the grading of hickory could be overcome and it be left more to the judgment of the wheel man, a part of the trouble could be avoided with respect to the unequal strength of the timber.

In conclusion it may be said that while the trouble arising from crooked

car can be built for less money. However, it is a question whether it pays in the long run; because when a car is discarded it is usually because the working parts of the machinery have become worn—perhaps the pistons or cylinders having been affected by wear. However, it is not infrequently the case that a perfectly good pleasure car will be discarded in favor of a newer design or for a different style or perhaps for a different make. And in such

tending forward 3 feet over the entrance to the car. The framework is built before the panels are put on, as shown by the dotted lines in the side view (Fig. 1.) Six upright posts and five ribs run lengthwise to stiffen the sides. The upright posts curve from the sills to a height of 21 inches, convex to the sides and rear end of the body, as seen in the end view and also at the end in the side view. Two oval windows are put in the sides of the body just above the driver's

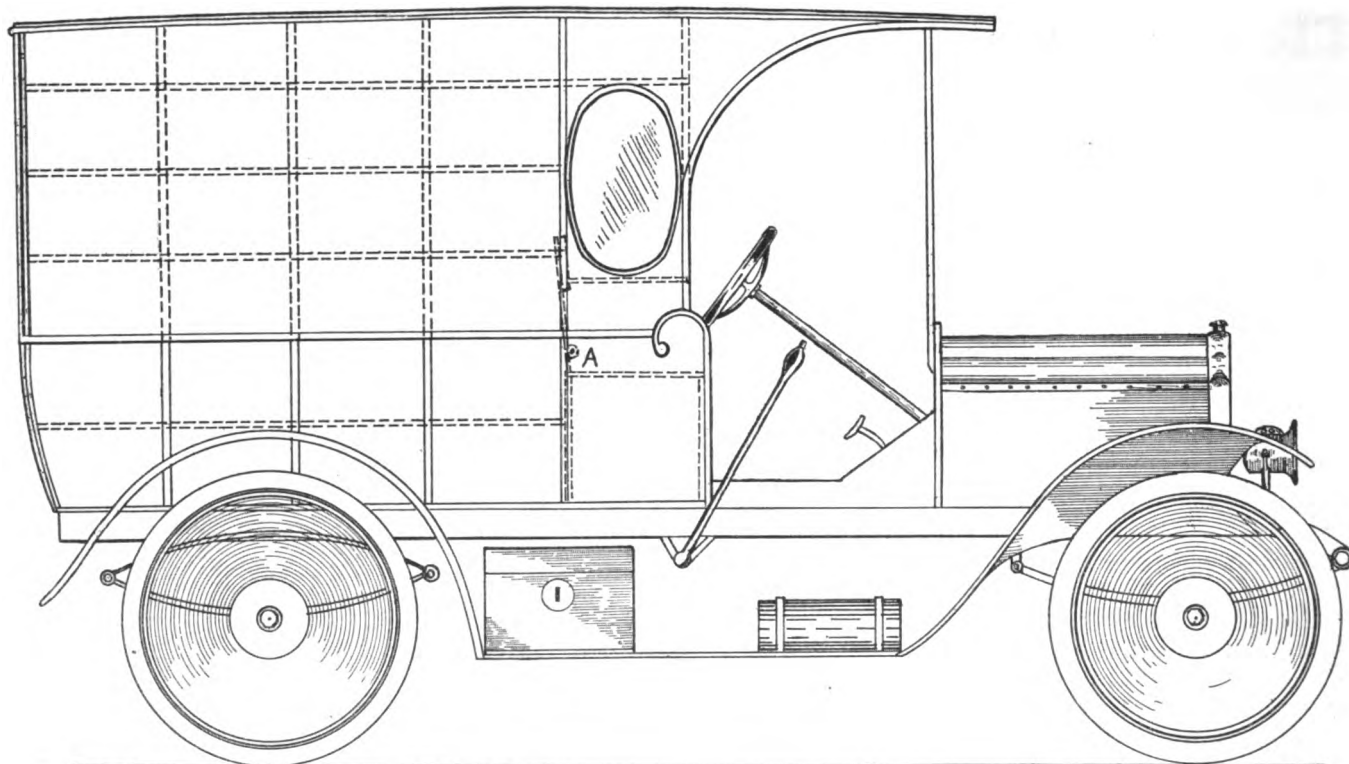


FIG. 1—SHOWING A SIDE ELEVATION OF THE TOURING CHASSIS WITH DELIVERY BODY ATTACHED

wheels can be reduced by exercising more care on the part of the vehicle men, it will never be entirely eliminated.

A Delivery Body to Replace the Touring Body of a Used Car

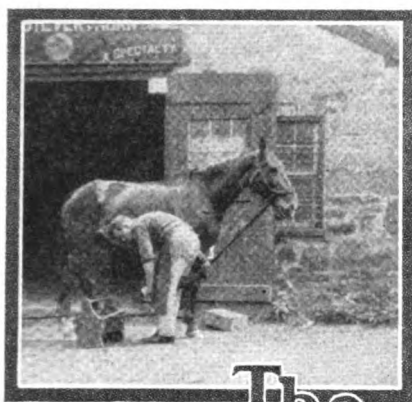
NELS PETERSON

The engraving shows the plans of a delivery auto built for a department store. In this case the chassis was bought second-hand; having formerly been used as a touring car. The old body was removed, and a new one, as shown, was made to fit the old chassis. In this way a little saving can be made on the first cost of the chassis and, consequently, the

cases a perfectly good chassis with a good motor and good working parts can be secured at a comparatively low figure. Even though the working parts be somewhat worn, if the chassis is secured at a low price the owner can afford to have new parts put in to replace those that are worn, and the blacksmith by observing the motor and chassis carefully can, without doubt, supply such needed parts at a neat profit to himself.

The body as shown herewith is 5 feet high from the sills to the roof. It is 3 feet 5½ inches wide at the bottom and 3 feet 10½ inches at the roof. The side panels are 6 feet 8 inches long from the rear corner-posts to the posts in front of the driver's seat, with the roof ex-

seat, and two of similar shape, but smaller, are placed in the rear doors. The driver's seat, as shown at A, has a folding lazy back to enable the driver to get inside for goods not accessible from the rear doors. In building this body to fit the frame of the chassis it was necessary to make the sills extra wide, namely, 6½ inches. No crossbars were used; the sills being laid flat on the frame and bolted down. ½-inch maple boards were used for side panels, with molding to cover the seams, as shown by the full lines. Maple boards, ¾-inch thick, were used for covering the roof, and heavy duck cloth or canvas was stretched over it and fastened down with drip molding around the sides, front and back.



The Horseshoer

The Farriers of Gibraltar

GEORGE CECIL

The two chief characteristics of the horseshoeing business in Gibraltar are the comparatively small number of horses which are shod and the apathy with which the lazy "Rock Scorpions"—as the local Spanish farriers are known—go about their work. Indeed, the condescension displayed by the average swarthy Jack Spaniard suggests that in accepting the offer of a job the fellow imagines he is doing his patron a favor. He saunters through his work as though it were a pastime, and the exertion of shoeing one hoof necessitates a drink of the country wine (which is extraordinarily inexpensive) and a *siesta*. Having refreshed the inner man he turns to and fixes another shoe, after which the slug-gard again retires to the welcome shade of a bunch of cacti and, stretching himself out at full length, rests his unshaven cheek in the hollow of his brawny arm, tilts his soft felt over his roguish eyes and sleeps for an hour or two. Sometimes the impatient Spanish groom wakes him and expostulates in the heated vernacular of the fiery South. The slothful farrier, however, is not in the least perturbed;—even when he learns that he will lose his job if he does not immediately complete the work, a contented snore is the only reply vouchsafed. But if he is very much in need of a few dollars with which to buy finery for the Carmen of his affections, or a cask of wine and a packet of cigarettes for himself, he may sleepily mutter the word "*mañana*," meaning that he will finish the task the next day. It may be added that the "Rock" farrier never, by any chance, grows

rich. In fact, he does not even save enough to buy himself the smallest annuity.

His clients include the mounted officers (who bestride chargers), subalterns and other warriors who can afford ponies, the members of the Calpe Hunt, and the farmers in the neighborhood. He also numbers amongst his customers the carters who employ mules in place of horses; the mule, and even the jackass, being in general request as a beast of burden. The sure-footed creatures have no difficulty in climbing the steep, narrow streets of "Gib," and their powers of endurance are great. Fortunately for the good of trade, shoes wear out quickly, and though, from motives of economy, many a Jack Spaniard puts off the evil day as long as possible, the services of the farrier sooner or later are requisitioned. He also has a large clientèle amongst the country people who live on the outskirts of Gibraltar. He may spend a couple of weeks in each month going from village to village, from hamlet to hamlet, working for all who choose to employ him—from the local lord of the manor down to the poor peasant whose sole capital is represented by his Castillian mule. If the tour is productive of a pocket full of silver, on returning to the white-walled, flat-roofed hut which he occupies under the shadow of the batteries, he leads a lotus-eating life until there arrives the evil day when he is reduced to his last copper. Then there is nothing for it but to live upon his friends or to look for work once more. Having decided to turn an honest penny, "Miguel," lighting a cigarette and cocking his hat very much over his left ear, saunters through the market-place on the lookout for information. Learning that some well-to-do Señor has dismissed his farrier for laming the best nag in the stable by cutting away too much of the toe, and armed with a few testimonials which he has hired from a dealer in these wares he calls to proffer his services. He also waits upon the various officers for whom he has worked before; and if he sees a mule which requires shoeing he pesters the owner till he is allowed to replace the worn-out shoes. It, however, must be remembered that only the fear of starvation rouses him to activity. In nine cases out

of ten the fellow is content to sleep away the greater part of the day and to share a meal with some good-natured friend who has enough for two. As a rule, "Miguel" is as idle as he is unskilled. Except that he uses somewhat primitive appliances, the Gibraltar farrier's methods differ little from those in vogue in England or, for that matter, in any other country. His files, hammers and knives, which he procures from Seville, are similar to those in use in other smithies, and his supply of nails is procured from the same source. If he can summon up sufficient energy he spends part of his spare time making shoes; and if, when a customer brings him a horse or a mule, he has none ready, he borrows or even buys some from a fellow practitioner. When called upon to shoe a fractious animal he casts it, or uses a twitch; and if he sustains the slightest bodily hurt he displays unusual activity in

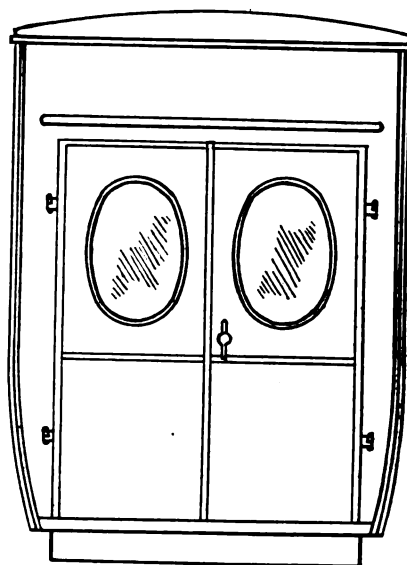


FIG. 2—REAR ELEVATION OF AUTO-DELIVERY BODY

claiming from the owner of the obstreperous animal compensation which is out of all proportion to the damage done.

The Spanish farrier's fee is a small one; but the wind, fortunately, is tempered to the shorn lamb. He manages to support a wife and to bring up a family, while he and his seldom go hungry to bed.

Bob Jenkins and His Elephant Shoes

J. C.

Bob Jenkins was a blacksmith of the old school, and was generally



credited with being a workman a little bit better than the average, as well as being of the kind that did not begrudge going out of his way to help a neighbor. Bob, however, did not always stick strictly to facts when giving his experiences, but no one bore him any ill-will on that account, as he was always particular not to say a thing that would cast reflections or injure anyone in the least. A few customers gathered at Bob's shop one afternoon, and were busy discussing current topics and politics when one of them happened to pass a remark about a circus coming to an adjoining town. At this, Bob stopped short in the middle of working a heat, laid the piece back in the fire, rested the head of his hammer on the anvil, his foot on the corner of the block and with a look of disappointed concern on his face asked if it was the same circus that had visited the town a couple of years before. When answered in the affirmative he shook his head and said: "Well, I hope they will take their elephants to someone else this time. The last time they were here I shod six of their big brutes and came near killing myself. Would you believe it, it took 42 inches of

and had to make just an even gross to do the job." At this a hearty laugh went 'round the shop. But one of the bystanders, noting a puzzled look upon Bob's face and evidently intent upon explaining to Bob the reason for the seemingly untimely hilarity, advised him that all the elephants he had ever seen were barefooted. Then it was Bob's turn to laugh.

The Question of Credit

W. E. MCGREGOR

The very keystone of business is credit integrity. A man who is used to commercial dealings of any size knows that it is an utter impossibility for him to succeed if he does not consider a debt as an obligation upon himself, the same as any other contract. He cannot dodge it, he cannot neglect it, he cannot evade it, and get anywhere in the commercial world.

Many smiths, as well as others in the commercial field, have felt inclined to discontinue credit trade and sell only for cash. Why,—when a debt is a legal contract? Briefly stated, the reason is that they have lost too much money on work which

more of that." They did not stop to consider the whys and wherefores, to discuss the proposition, to weigh the evidence, but simply vetoed a credit business because they were unable to collect their money.

And why were they unable to collect? Let me tell you. First: because they were too liberal with credit; they gave more credit to some people than those people were entitled to. They did not look upon a dollar's worth of credit as an actual dollar of real money.

Second: The old "Day Book and Ledger," or "Scrap Paper Ledger," method of handling charge accounts was so unreliable and was the direct cause of so many losses that they became discouraged about the whole credit business. They did not see that it was not entirely the customer's fault, but in reality their own, because of their method of handling credit.

Third: They allowed too long a time for the credit to run. Instead of extending credit for a month or so, they allowed it to go a year or even more. Manufacturers and jobbers allow discount on bills paid in a certain time, to induce early payment, and if payment is delayed too long, they sharply call attention to the fact.

Fourth: There are many good blacksmiths and good horseshoers, but they are not good bookkeepers. Furthermore, bookkeeping bothers them; they do not understand it: they seem to think it a useless expense; they are, therefore, careless, and so their books become a serious source of loss to them.

Fifth: They gave credit unwisely to people who were not entitled to receive it. They thought, as the old proverb says, "A bird in the hand is worth two in the bush." But they did not know—they didn't strive to know—what kind of a bird they held. They were too anxious to get the work—instead of getting the money behind the work.

These are the main reasons why some smiths are changing their business from a credit to a strictly cash basis. They are some reasons, but the whole thing sums itself—the act is involuntary—into one word: system—system that is rightly and enthusiastically applied. A system with a brain behind to push it up the road of success.



THE IRON HORSE OF THE FARM. ARE YOU STUDYING THE TRACTOR-REPAIR SITUATION?

1 by 3-inch iron for each shoe, and the blamed things weighed nearly 40 pounds apiece. Then I did not have nails more than half long enough

they had done on credit, but for which they were unable to collect. They immediately grabbed hold of that word "credit," and said, "No



In considering a credit business, what are its advantages? Let us see. First: The best people in every community wish to buy on credit. As a class, these are the people who make the largest purchases and who buy the best. They are the most desirable customers for a shop which gives first quality of workmanship and material.

Second: More regular customers are gained. If a man runs a charge account at your shop he is more apt to have work done at your shop and with greater regularity. The smith can count on a certain trade from that man, which trade will not vary materially. When he has enough trade of this character he can figure quite accurately on the amount and kind of business that he will do.

Third: There is a most friendly feeling between the smith and a good charge customer. He knows the credit customer by name, knows exactly where he lives and knows how much of his trade he is getting. On the other hand, the customer knows the smith in a better way. Indeed, the personal acquaintanceship between the shop owner and customer is a great factor in keeping trade from competitors. Human nature has not changed; we all like to deal with people with whom there is a friendly feeling and personal acquaintance.

Fourth: The charge customer is not so inclined to "shop around," and quibble about the work, and drive a hard bargain, and wrangle over the price, as is the cash customer. This is a more far reaching argument than may first appear. A man with money in his hand feels that he can be just as mean as he wants; he is independent, has got the money and can trade anywhere. That makes him more critical and harder to deal with. For any reason or whim, whatever, he is apt to trade this week in your shop, next week in another, and where he pleases the third week. He does not become a good customer of any shop, but scatters his trade until it is not worth a great deal to any one shop.

Fifth: Very few shops can handle only the finest material, employ the most competent workman and run on a strictly cash basis. There may

be exceptions to this rule, but it is so universal that the exceptions need hardly be considered. This is another way of saying that what are generally considered the best customers now buy, and always will buy, on credit.

These are the reasons for establishing business on a credit basis. Combining these with an efficient system for using credits, they far outweigh any advantages claimed for cash. The only disadvantage of credit is, as we have already enumerated, the inability of collection. By incorporating an effective means of handling credits, there is nothing to fear from a business conducted on those lines. As I said before, the whole question resolves itself into one thing: system. It is not a question of whether you should handle cash or credit, but of

your system—live with it—think about it—improve it.

The Lion Gates at the Royal Palace, Hampton Court, London

J. Y. DUNLOP

The smith, the oldest craftsman, enjoys the distinction not only of making the tools used by other craftsmen but of being able to use the tools he makes himself.

Among the most famous examples of smithwork in England are the Lion Gates at Hampton Court Palace. These gates were made by Huntingdon Shaw who is generally credited with being the best of English ironworkers. They were fashioned from

the design of a Frenchman named Jean Tijon and are as fine a specimen of decorated ironwork as was ever executed in England. Each gate consists of upright side panels capped with crowns; these panels affording means of support for the whole by buttresses and framed stanchions that enclose a central compartment, itself embracing a small subsidiary panel where some of the national emblems—the harp, the rose, the thistle and the monograms of the then king and queen are introduced.

In the introduction of these details we have no record that a model was used, but, nevertheless, the reproduced effect is free from stiffness and dead-like finish. In forging the rose, each leaf and petal was hammered out separately from light bars, after which they were arranged in proper relation to each other and welded. The smaller petal of the rose was made first by drawing down a stem about one inch long and one-eighth inch square from a bar of one-fourth inch stock. When this was done it was separated far enough from the drawn-down portion to leave sufficient stock to form the petal, which was hammered out to the desired shape and size while the stem was held in the tongs. It was then hollowed out to form the shape of a spoon. When three had been made in this manner they were arranged around a small egg-shaped core and held in a circle-jawed pair



THE LION GATES AT HAMPTON COURT, LONDON, ENGLAND

handling that *cash and credit* on a profitable basis. A basis that will give you effective returns and justify your efforts in installing and operating it.

I am prompted to write this, to urge those brother smiths who are at sea regarding the question of credit, to see the necessity of using credit and adopting a means for the carrying out of it. The numerous systems that have appeared in THE AMERICAN BLACKSMITH are of a wide and varied enough nature for any brother to choose according to the conditions prevailing in his section and with reference to the character and amount of business which he does. Select your method with discrimination; keeping in mind all the peculiarities of your individual wants. Then, apply it with a whole-hearted enthusiasm, under the influence of which nothing can fail. Believe in



of tongs while the stems were welded together.

The next row or layer of petals was then forged and hollowed out in the same manner, with the exception of being a little larger. These were arranged around those already welded and the welding process repeated. Four or five petals were arranged in the next row and so on with two other rows until the flower has been completely welded together. Next, the buds and sides of the petal were curled back to give the rose

or cold cutting whatever was done on this gate, and it is so well and artistically executed that it is still one of the interesting features at Hampton Court.

How to Point a Plowshare

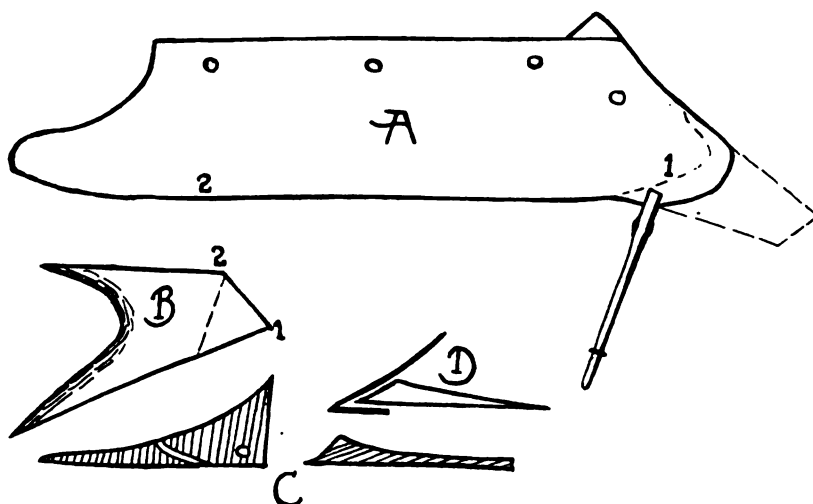
C. W. JACKSON

As regards pointing a plowshare, there has been some very good suggestions in *THE AMERICAN BLACKSMITH*. The following is the method I have used successfully for some

hollows are and raise it out level on top.

In making a scarf on plow plate, as at dotted line 1 in A, make it real sharp; then it will weld down so when ground off you cannot see where it went together. Now sharpen the share back as far as 2 in A. Cool it off until you can take the point in your hand and then heat and throw the old wing around and square the heel. I don't always do this when I sharpen a share, but when you point it, fix it all up so that when the fellow comes to get his share he will say: "It's as good as a new one that costs \$3.00 or \$3.50. I'll fetch you some I throwed away last year because the blacksmith over in our town said they could not be fixed, and you can fix them in your spare time."

Some blacksmiths may say this is too much work. I say it is not as much work as the way it is generally done by hammering a great thick chunk. You see I have no trip-hammer, so I dodge all of that work that I can. We get \$1.50 for putting on a point here, so that it is necessary to do it right. I put on five points yesterday, and the entire job was for one man and all the same kind of shares. They were worn much worse than the one shown in illustration, and it took me four hours. This amounted to \$7.50 in that time, using about 1½ sheets of Laffitte welding plate and \$1.00 worth of coal. The coal here is very poor and I have to pay \$1.25 per hundred.



A GOOD METHOD OF POINTING A PLOWSHARE

a natural appearance. It is in this finishing part that the grace and beauty of the iron model is obtained. After the curling was accomplished, the flower was taken to the anvil and finished with a sharp blow or a light touch here and there.

The harp was simple blacksmithing; and the work of forging the thistle was much the same as the bud of any flower. The leaves of the thistle were made the same as the petals. A stem was first drawn, then the long diamond-shape hammered out, reheated and hammered out flat. Next, the center rib was formed and then the radial ribs. These component parts of this graceful ornament were then welded together bit by bit.

In the gates, the graceful curves of the foliage scrollwork, and the lightness and delicacy of the leaves, stems and tendrils of the forged and beaten metal, are truly admirable and reflect the greatest credit on the handicraftsman whose artistic hammer and chisel wrought the beautiful shapes. It hardly seems possible, but the fact remains that no filing

time. A, in the engraving, represents a share that needs a point. The plate is quite wide, but the landside is nearly gone. You cannot use one of the points you buy to fix this share, so take a piece of 5/8-inch plow plate, cut a piece like B, sharpen it at shaded parts and then double it down at dotted line until points 1 and 2 come together. It will fit on share, as dotted lines at A. Now take a piece of 5/8-inch square machinery steel, and forge piece to fit landside, like C—the top view is shown at the right. Now take your pieces, B and C, and put them together as at D, and weld at the point, using borax. Put this piece on the share, as dotted lines in A, and catch with tongs. Then put a ring on the tong handles and weld on landside and along shin of share. Take off tongs and raise up piece and slip in a piece of welding plate and weld down smooth. Pene it well with the bottom side upon anvil and hammer it in close to the landside. If the part on top is uneven, heat well and hammer the lumps down from the top. Now turn it over and hammer where the

Thoughts On Timely Topics

By THORNTON

Caustic Censure and Cheery Comment

SIDE-LINES? Yes, I believe in them. They helped build up my business, but no one ever caught me making chop feed when an axle was to be welded or when a pair of new kicks were to be fitted to Dobbin. There's a place for side-lines, and a shop owner wants to be sure he doesn't pick the wrong line for his place. That is the great trouble. And then there's a time for side-lines, too. When a customer comes in to get a new pair of shafts put in a buggy is no time for a side-line. The time for a side-line is when there is nothing doing on the main-line. And if you are so fortunate as to be



kept busy on the main-line, alone, then forget the side-line. I remember, some time ago while down through the center of the State, I came across a shop one day that was about as busy as an undertaking establishment between funerals. Seeing that I could not possibly interfere with the smith's pursuit of riches, I stopped to chat. After I had been talking about ten or fifteen minutes, a lean, lanky tiller of the soil, with about ten ounces of fine-cut tucked away in one bulging cheek, drove up in a rig that looked as though it had been used to draw lumber for the ark. Mr. Lean-and-Lank unfolded his legs and descended from his perch with a great deal of deliberation and, after depositing a pool of dark-brown tobacco juice of liberal proportions just outside the shop door, he asked: "Can y' do a bit o' grindin' fer me, right away, Joe?" To this the smith "lowed" he could. So the smith, after assisting the farmer into the shop with the bags of feed, began to tinker with the engine. He fussed with the carburetor, tried the batteries and finally after pouring some fuel in the fuel tank he got the ancient piece of machinery started. He then discovered that the feed grinder was "purty dusty." "Hain't used it for a few days," said the smith. But from the amount of dust, dirt and what-not that he removed from the grinder I judged that it hadn't been in use for several years. Finally, the grinder was started and the feed going through in good order. At this stage a farmer drove up and asked if the smith could do a shoeing job right away. "Can't get at it 'till I wait on this man," replied the smith. Upon hearing this the farmer drove away murmuring something about smiths and feed grinding. When the job of grinding was finished, the smith received twenty-five cents from the owner of the ground feed, and helped the farmer put the bags into his wagon. When I asked the smith how much he made on that kind of work he said: "Well, I used about five cents' worth o' gas, so I guess it was twenty cents easily made." Then I said, "what about the shoeing job you turned down?" To this he replied, "well, y' can't help them things. Y' gotta wait on yer customers as they come in." I was at first inclined to en-

lighten this man on a few matters connected with business, but I was afraid the seed might fall on barren soil, and starve. Oh, yes, I believe in side-lines, but I don't believe in side-lines that put sand in the gearbox of the main-line. If you've got room and time for a side-line, take it on, but see that it fits into the business like the missing part of a block puzzle.

Some Opportunities in Georgia

Here are a number of live opportunities for live vehicle men who have the energy, skill, determination and capital to start a vehicle factory. These towns are all situated in Georgia and will co-operate financially and otherwise with the builders of vehicle factories who can show the required energy, skill and determination. If you want to start anew, and want to locate a vehicle factory of large or small proportions in Georgia, write to

GEORGIA CHAMBER OF COMMERCE,
1001-3 Hurt Building,
Atlanta, Georgia.

- 1.—Covington—Newton County.
- 2.—Griffin—Spalding County.
- 3.—Hawkinsville—Pulaski County.
- 4.—Locust Grove—Henry County.
- 5.—Macon—Bibb County.
- 6.—Statenville—Echols County.
- 7.—Toccoa—Stephens County.
- 8.—Albany, a city of 15,000 inhabitants, offers an exceptional opportunity to anyone with the necessary capital to finance the operation of a plant already built. The question of paying for the machinery, plant and stock of this business will be satisfactorily arranged by the city of Albany for the proper kind of man.



The Editor and Benton Discuss Vulcanizing Profits

"Well, Benton, what's new?" questioned the Editor as the man of recipes came in and took his favorite chair.

"Nothing," returned Benton, elevating

his feet to an adjacent chair seat and puffing at a "near-cigar."

"Haven't you been away?" asked the Editor.

"Yes," replied the other.

"Well, what did you learn? You can't sit there and tell me that you have been away from this town without bringing back something in that book of yours. And, furthermore, I want you to hand over some of the matter you've come across without my pulling and dragging it out as though I were pulling teeth." And having gotten this off his mind the Editor waited for Benton to talk.

"If you'll tell me where you hid those good cigars, so I can smoke without holding my nose shut I'll tell you all about what I've learned," said Benton.

"Oh! I see. I've got to bribe you into talking, eh? Well—" And here the Editor took a box from a drawer in his desk and offered it to Benton. "If that is all you want, here you are."

After Benton lighted his new torch, and looked twice at the burning end, he began:

"I went down to call on Harry Garwood and to look into this vulcanizing proposition. And I've had my eyes pretty well opened. I've generally considered vulcanizing rather a smallish job, but let me tell you there's good profit in it; and it seems to me it should be a cinch for a blacksmith to get into this work."

"Now, just let me tell you what happened while I was in Garwood's place. He had a number of jobs that came in that morning. You know Garwood does general work, and he says he takes care of his rubber-tire work in the afternoon so as not to let it interfere with his other work. Well, as I was saying, he had several jobs there that were brought in that morning. The first one was a blowout. Now, the materials he used amounted to about a dollar and a quarter all told, and he received three dollars from the owner for the repair. For overhead, Garwood figures 15% on tire work. This he says is high, but he says he figures safe. That leaves him a neat profit."

"That gives him a profit of—" put in the Editor, figuring—"a profit of 43½ percent. That compares quite favorably with the usual work done by a general smith, and it doesn't seem to me it would require a very large investment."

"No, it doesn't," returned Benton. "Garwood has a tire equipment that I am pretty sure cost him less than one hundred dollars; and he can mend blow-outs and casings and can vulcanize tubes with this outfit. On casing repairs he figures on a lower percentage of profit, but as his profit figure is still around 33 to 35 per cent, he doesn't lose any money. Of course it takes longer to make a casing repair and it requires more material than on tube work. On tubes, for example, Garwood says it is often possible to make a repair and do it right at a cost for materials of from 3 to 6 cents and get 50 to 75 cents for the job. To vulcanize small punctures, cuts and tears, doesn't require much material and time, and yet a motorist is glad to pay from 35 cents to 75 cents for what, when properly repaired, is practically a new tube."

"That work should certainly appeal to the smith who has time or can make time for it," said the Editor, when Benton finished. "Seems as though tire work would be a good means of introducing the smith-and-auto-shop to motorists. And when there is promise of good profit, there doesn't seem to be any real reason for not taking up the work." And with this the Editor turned to give his attention to a batch of new proofs from the printery.



Smithy Song

When I am half a-dreaming,
And only half asleep;
When daylight's grayest gleaming
'Gins through the blinds to peep,
Oh, then I hear the dinging
Of the smithy hammers ringing,
Ching ching, ching ching,
Ching ching, ching ching.

At eve when I'm returning
From labors of the day,
Their forges yet are burning,
And still their hammers play;
And oft the smiths are singing
To that measured, merry ringing,
Ching ching, ching ching.

Often when rhythmic bending
Of bodies to and fro,
They toil in couples, sending
The sparks out, blow on blow;
One hammer always swinging
The while the other's ringing,
Ching ching, ching ching.

O, merry anvils sounding
All day till set of sun!
It is by steady pounding
That noblest tasks are done.
By sturdy blows and swinging
That keep the world a-ringing,
Ching ching, ching ching.

(George Horton in Century Magazine)



Heats, Sparks, Welds

Food for thought: higher prices.

Keep your customers and they'll soon keep you.

Don't mix the two—temper in a tool and temper in a man.

Dollar for dollar, automobile profit is just as good as horse vehicle profit.

Good idea, sometimes, to change one's mind; to show one has a mind.

The whistle makes the most noise, but it doesn't help to pull the train.

Friction is the enemy of movement; worry is the antagonist of work.

Reputation—also known as "good-will"—is the foundation for a business success.

Kind words are like borax on iron—they weld together in mutual friendship.

Ever notice: luck has a habit of favoring people with brains? They spell it with a "p."

There's no virtue in the smile that won't come off—it's the ready smile that helps.

No matter how big his hand is, the man who measures by rule-of-thumb is pretty small.

It's hard for empty bags to stand up; same way with empty people; they use a nail-peg.

A study of hoof-paring is more likely to produce a swelled wallet than a study of price-cutting.

Tom Tardy says: "Y' don't hev t' keep bees t' get stung." Tom ought to know, is all we can say.

"Look before you leap;"—you may land in a patch of sweet clover or a bunch of Canadian thistles.

Don't hitch your wagon to a star—especially if it's a falling one. Hook up with some live side-line.

Tomorrow;—people who are always talking about tomorrow, usually have nothing to be proud of, today.

Your apprentice likes encouragement. A good way to keep him interested is to let him share some of the credit.

Progress—that word we talk so much about—consists in doing a little better today than we did yesterday.

Price doesn't always determine the satisfaction of a customer; quality—wearing quality—is the deciding factor.

Labor is painful; it takes a man to keep his shoulder to the wheel. How can you increase the joyousness of work?

Overhaul your engine at least once a year. You can then count on reliable service, and it'll last several years longer.

Tact is in business what strategy is in warfare. Therefore, never jump at conclusions or you're liable to land with a dull thud.

It doesn't matter how big the boat is, a leak will sink it. And no matter how big the business, a leak will sink it. Any leaks in your business?

"Reading maketh a full man." It certainly does—full of ideas, short-cuts and new methods. Read every issue, and—tell your neighbor.

New Zealand, it is said, has the longest straight line of railroad in the world. These tracks extend for a distance of 136 miles in a perfectly straight line.

Business is the vehicle to success. Push it everlastingly and you'll arrive. Let it try to push you, and you'll slide below the starting-point—bankruptcy.

A smith we know encloses a neatly printed card in the envelope with every receipted bill. The card reads: "I enclose receipt for your recent remittance—Please accept my thanks."

Backbone is needed in managing the business as well as in the actual work. It takes backbone to refuse credit to those who don't deserve it, and backbone to collect from the "dead-beats."

The steam that blows the whistle never turns the wheels. You are probably acquainted with some people who use all their steam (energy) for "blowing," and consequently their "moving" lags.

Imagination is an attribute that business men seldom use. No institution came into being, no great engineering work was done, no reform came about until somebody first imagined it as actually existing. Use your imagination.

"Your paper is just as good as anyone could wish for. It covers about everything in this line, but what I like most is Heats Sparks, Welds. If that page does not put some grit into a fellow, he is a 'dead one,'" says Irvin Miller of Pennsylvania.

When reaching inside a tank, gear case or article of similar construction, with a wrench, hammer or other tool, it is well to attach the tool to the wrist with a loop of cord, to prevent the tool from dropping inside the tank in the event of its slipping out of the fingers.

It's a poor kick that does no one good. At least that must be the thought of Joe Brooks of Sharon, Pennsylvania. Several years ago Mr. Brooks slipped on an icy walk and dislocated his knee. It left him a cripple until the other day. He was shoeing a horse when the animal kicked him, the displaced bone of his knee snapped back into place, relieving him of his deformity.

Tell the Horse Owner: Don't leave the team when hitched to a cultivator, plow, harrow or other implement. You can never tell just when even the most gentle team is going to take fright. Best be on the safe side.

When he brings in a sore shouldered horse, look to the horse's collar. A horse collar needs cleaning, and in the busy season the cleaning should be very frequent. Wiping the hot shoulders with a cold, damp sponge at night is a great relief to the animal.

"False and misleading advertising" is now prohibited by law in New York City. Why not make it national? THE AMERICAN BLACKSMITH for many years—ever since its beginning, in fact—has had an honest advertising law in full force and operation. Our Honest Dealings Paragraph, published in every issue, and our Pink Buffalo Stamps, are a strong combination that insure "Our Folks" against the tricksters in advertising. Every city, town and State should have a law prohibiting untrue and deceptive advertising. No honest man will object to such a law.

"Son of the Forge," said Solomon, 'I honor thee, thou worthy successor of the great master, Tubal Cain. Take thou this seat at my right hand prepared for the most worthy—it is thy due!' And thus it came to pass at the feast of Solomon, the wise King of Israel and from that time forth the smiths were held in high esteem and greatly increased and multiplied in all lands."

Are you living up to the traditions of the craft? Are you helping to make the craft "worthy"? Are you "held in high esteem"? Are you boosting or knocking? Are you building up or tearing down? If the craft isn't what you want it to be, help make it better—but, don't make it worse by knocking. The craft is better today than ever before, and conditions, shops and men are improving—not getting worse as the knockers would have you think. Boost and keep persistently at it.

C. Kern, the Australian painter, has produced in "The Blacksmith" an oil masterpiece that will make his name familiar to every smith who appreciates good pictures. Mr. Kern has painted into his picture the very spirit and atmosphere of the forge. Every feature, every detail of the masterpiece is perfect. The old forge fire sends its warm glow through the picture, and the smith with his smile of satisfaction over his labors seems to dominate the entire composition. You view the masterpiece critically, you smile with pleasure at the finished picture and you wish for a hearty handshake with the sturdy old veteran smiling out at you from the canvas. "Our Journal" now owns this masterpiece. We have had it reproduced in full color. Wouldn't you like a copy for your home or shop? Learn how to get a copy free as told in the announcement elsewhere in this issue.



Our Honor Roll

Watch It Grow

Just keep an eye on that 1924 Class. Notice how it grows by leaps and bounds each month. The Class of 1923 is large, but if the 1924 "Folks" keep on, as at present, the latter will surely outstrip the others greatly in numbers.

Let us see, "Good Folks," just how large we can make the Class of 1924. It is an easy matter to get into the 1924 Class, and the saving you make is considerable. Send in your 10-year term order and help make the 1924 Class the champion in point of numbers. Be one of the boosters and incidentally save as much as it costs you. Did you ever come across a better "real" bargain? Do it now!

	U. S. and Mexico	Canada	Other Countries
2 yrs.	\$1.60 save \$.40.....	2.00 save \$.50.....	10 sh. save 2 sh.
3 yrs.	2.00 save 1.00.....	2.70 save 1.05.....	14 sh. save 4 sh.
4 yrs.	2.50 save 1.50.....	3.20 save 1.80.....	18 sh. save 6 sh.
5 yrs.	3.00 save 2.00.....	3.75 save 2.50.....	1 £ save 10 sh.
10 yrs.	5.00 save 5.00.....	7.00 save 5.50.....	1 £ 14 sh. save 1 £ 6 sh.

Send your order and remittance now—today. Don't wait until you forget all about it. You'll never regret it. Our subscription insurance saves you money. The sooner you begin saving the more you save. There is no time better than NOW.

NAME	Subscription Paid to	NAME	Subscription Paid to
THE FIX-IT SHOP, Utah.....	July, 1935	E. ANDERS & SON, S. Aus. May, 1922	
W. C. WATT, Kan.....	Dec., 1930	LOUIA CARRIAGE Wks., Va. May, 1922	
WADDINGTON FARM, W. Va. Mar., 1928		S. SMITH, Tex.....	Apr., 1922
I. J. STITES, N. J.....	Jan., 1928	J. W. HAAR, La.....	Mar., 1922
J. H. DAVIS, Cal.....	Dec., 1924	E. A. DILLON, Nev.....	Mar., 1922
F. SRAMEX, Neb.....	Apr., 1924	D. W. SMITH, R. I.....	Mar., 1922
L. A. HULEN, Cal.....	Apr., 1924	D. F. KUSTER, Wash.....	Mar., 1922
W. B. BRIANT, N. J.....	Mar., 1924	G. F. JOHNSON, Mich.....	Feb., 1922
A. BOECH, N. Y.....	Mar., 1924	R. H. KEITH, Iowa.....	Jan., 1922
A. R. JOHNSON, R. I.....	Feb., 1924	O. M. JOHNSON, Minn.....	Oct., 1921
F. JACOBS, Ohio.....	Feb., 1924	H. FELDUS, Neb.....	Sept., 1921
H. D. ERSKINE, Vt.....	Jan., 1924	W. K. KLING, Kan.....	May, 1921
E. G. WALKER, Cal.....	Jan., 1924	F. NORRIS, Yukon Ty.....	Jan., 1921
E. FOWLER, Pa.....	Jan., 1924	J. L. JASTER, Mo.....	Jan., 1921
BRENN & SON, Ireland.....	Dec., 1923	T. P. CONSIDINE, Mass.....	Dec., 1920
M. LAMORREAU, Ohio.....	Dec., 1923	ED. GRIMM, Tex.....	Mar., 1920
C. R. DAVIS, N. Y.....	Dec., 1923	R. S. CRISLER, Ky.....	Jan., 1920
F. W. COVELAND, Me.....	Dec., 1923	P. REIF, Ohio.....	Dec., 1919
J. L. TOMLIN, Kans.....	Dec., 1923	P. GUDMUNSON, S. Dakota.....	Nov., 1919
H. A. DAVIS, N. Y.....	Dec., 1923	R. RAMACH, N. W. Ter.....	Nov., 1919
E. H. TROYKE, Ill.....	Dec., 1923	J. NAISMITH, N. Zealand.....	Nov., 1919
J. BAILY, Man.....	Dec., 1923	F. UNDERWOOD, S. Africa.....	Aug., 1919
F. WATKINS, N. H.....	Nov., 1923	J. T. WILSON, S. C.....	July, 1919
J. KOPPING, Ala.....	Nov., 1923	F. RASS, Sask.....	June, 1919
W. C. LIENERT, S. Aus.....	Oct., 1923	THEO. PASCHKE, Neb.....	Apr., 1919
W. B. ABELL, N. Y.....	Oct., 1923	I. M. TOWNSEND, Cal.....	Apr., 1919
W. R. TURNER, Man.....	Oct., 1923	G. BISH, Fiji Islands.....	Apr., 1919
C. NELSON, Neb.....	Sept., 1923	C. WILLIAMS, W. Aus.....	Mar., 1919
O. W. TAYLOR, Pa.....	Aug., 1923	J. P. MACKIN, N. D.....	Mar., 1919
CRAMP BROS., Tas.....	Aug., 1923	E. RAETZ, Kan.....	Mar., 1919
L. C. LARSEN, Iowa.....	July, 1923	C. T. HASKINS, N. Y.....	Feb., 1919
S. EFFENBAER, S. Africa.....	July, 1923	N. E. KOCH, Cal.....	Feb., 1919
G. L. DUWITT, Mont.....	July, 1923	C. W. M. BURROUGHS, N. J.....	Feb., 1919
W. W. GREGG, Tex.....	July, 1923	L. ARNTNER, Ohio.....	Feb., 1919
O. C. YOUNG, Mich.....	June, 1923	R. TAYLOR, N. Zealand.....	Feb., 1919
OTTO SIFFEL, Penn.....	June, 1923	R. STRODE, Ore.....	Feb., 1919
A. CHAFFMAN, N. Y.....	June, 1923	J. J. BEGERHOLM, Cal.....	Jan., 1919
C. BIRLEY, Md.....	June, 1923	L. A. TIEKING, Kans.....	Jan., 1919
F. H. STUPE, Penn.....	June, 1923	W. S. WAGNER, Tex.....	Jan., 1919
J. C. STOVER, Penn.....	Apr., 1923	J. G. GRONLUND, Conn.....	Dec., 1918
W. SCHOONOVER, Penn.....	Apr., 1923	BROWN & SCULLY, N. S. W.....	Dec., 1918
J. B. RUMMER, Iowa.....	Mar., 1923	A. HOSTAD, Minn.....	Dec., 1918
LOWNSDALE BROS., Mo.....	Mar., 1923	E. P. HOWES, Mass.....	Dec., 1918
J. CARSWELL, Ark.....	Mar., 1923	C. N. ROBINSON, Vt.....	Dec., 1918
G. E. GLASIER, Ohio.....	Mar., 1923	F. TRELEGAN, N. J.....	Dec., 1918
T. BRADLEY, N. S. Wales.....	Mar., 1923	G. F. VINCENT, N. Y.....	Dec., 1918
G. FATH & Co., S. Africa.....	Mar., 1923	J. R. CONARD, Kan.....	Dec., 1918
I. T. NEEDHAM, Ill.....	Feb., 1923	A. O. GIROUX, Mass.....	Dec., 1918
G. C. DIMINGER, Miss.....	Feb., 1923	A. A. MURRAY, Tex.....	Dec., 1918
J. HUGHES, Ohio.....	Feb., 1923	C. W. BRAKE, Mich.....	Dec., 1918
J. WIEBER, Minn.....	Jan., 1923	J. DUBENDORF, Penn.....	Dec., 1918
Z. A. ENOS, Kan.....	Jan., 1923	G. F. LAUGHLIN, Ill.....	Dec., 1918
W. G. WISE, Cal.....	Jan., 1923	L. M. PIATT, Penn.....	Dec., 1918
F. S. BISHOP, S. Africa.....	Jan., 1923	F. BOECKMAN, Ill.....	Dec., 1918
S. P. HARNBY, Mont.....	Dec., 1922	W. H. HABERMEHL, Iowa.....	Dec., 1918
W. BRECKNER, Okla.....	Dec., 1922	E. T. MARSHALL, Wis.....	Dec., 1918
J. PABIAN, Neb.....	Dec., 1922	F. HOOPFENGARDNER, Md.....	Dec., 1918
P. FREDERICKSEN, Iowa.....	Nov., 1922	HEBREW TECH. INST., N. Y.....	Dec., 1918
L. O. LINDERS, Ill.....	Nov., 1922	G. E. WINCHESTER, Cal.....	Dec., 1918
W. LAWSON, N. Z.....	Nov., 1922	F. T. GRISHAM, Ark.....	Dec., 1918
W. H. MILLER, Iowa.....	Oct., 1922	W. TAIT, N. Zealand.....	Nov., 1918
A. O. MARTIN, Idaho.....	Sept., 1922	A. LARSEN, N. Z.....	Nov., 1918
O. A. MORTIMORE, Idaho.....	Sept., 1922	R. E. RUSSELL & SON, Penn.....	Nov., 1918
H. J. WYATT, Wash.....	Sept., 1922	H. SCHAFFER, S. Dakota.....	Nov., 1918
J. N. SKOW, Iowa.....	Sept., 1922	D. MACDONALD, N. S. W.....	Nov., 1918
A. D. STANDFORD, Wash.....	Sept., 1922	C. A. RITCHIE, Scot.....	Nov., 1918
T. TREKINWIS, Que.....	Sept., 1922	T. E. SANDERS, Eng.....	Nov., 1918
A. PFYFFER, Ohio.....	Aug., 1922	G. E. HARDCASTLE, N. Y.....	Nov., 1918
G. D. VALENTINE, Iowa.....	Aug., 1922	W. VALLANCE, N. Y.....	Nov., 1918
W. HOFFMAN, N. Y.....	July, 1922	C. ZIEHR, Iowa.....	Nov., 1918
J. ERMAN, Ark.....	July, 1922	CYCLONE GATE & FENCE CO., S. Africa.....	Oct., 1918
W. K. W. HANSEN, Pa.....	June, 1922	W. ALSON, Minn.....	Oct., 1918
ROBERT TONCHER, Cal.....	June, 1922	H. P. BOWERMAN, N. D.....	Oct., 1918
J. VAN MAETER, N. Y.....	June, 1922		

NAME	Subscription Paid to
J. DELANE, Neb.....	Oct., 1918
P. DEVERNEY, Vict.....	Oct., 1918
H. C. HENDERSON, Queens.....	Oct., 1918
J. ELEY & SONS, S. Aus.....	Oct., 1918
J. E. MATTHEWS, Eng.....	Oct., 1918
MUNRO & Co., N. Z.....	Oct., 1918
D. R. WINTON, N. S. W.....	Oct., 1918
E. SCHRAPEL, S. Aus.....	Oct., 1918
A. QUAY, S. Africa.....	Sept., 1918
J. WILKINSON, Queens.....	Sept., 1918
GRIMLEY, Ltd., N. S. W.....	Sept., 1918
C. E. BIRLEY, Md.....	Sept., 1918
J. F. BAGGETT, Queens.....	Sept., 1918
J. THORNTON, N. W. Ter.....	Sept., 1918
W. A. THUGG, Queens.....	Sept., 1918
A. L. VARRIE, S. Africa.....	Sept., 1918
GEO. A. PETTIT, Utah.....	Sept., 1918
G. W. HAZLETT, Pa.....	Sept., 1918
C. WALTER, Ore.....	Sept., 1918
T. B. HOLZ, Okla.....	Sept., 1918
ROBERT COOK, Ky.....	Sept., 1918
A. B. WENDLANDT, Wash.....	Sept., 1918
A. J. BROOKMAN & Co., Vic.....	Sept., 1918
PETER COCKE, W. Aus.....	Sept., 1918
R. J. TOMPKINS, Texas.....	Sept., 1918
J. VASCHETTI, Colo.....	Aug., 1918
E. C. PUXTON, So. Aus.....	Aug., 1918
V. D. SIBLEY, B. C.....	Aug., 1918
L. SMITH, Cal.....	Aug., 1918
W. CRIBB, Queensland.....	Aug., 1918
GEO. REID, S. Africa.....	Aug., 1918
H. KULENBENZ, N. J.....	Aug., 1918
W. D. BRADFORD, Cal.....	Aug., 1918
A. DISCHER, Aus.....	Aug., 1918
T. H. GRAHAM, Vict.....	July, 1918
GILBERT BROS., S. Aus.....	July, 1918
A. MACKENZIE, W. Aus.....	July, 1918
GEO. DASH, N. Zealand.....	July, 1918
C. R. OLIVER, S. Africa.....	July, 1918
L. G. REID, S. Africa.....	July, 1918
W. M. PURYEAR, Ala.....	June, 1918
THOM & VERSTER, S. Africa.....	June, 1918
L. LACASTE, Que.....	June, 1918
WRIGHT & SON, Texas.....	June, 1918
ALBERT MELLUM, N. D.....	June, 1918
J. LINDSAY, S. Africa.....	June, 1918
J. H. GIBBS, S. Africa.....	June, 1918
W. W. BRIDGES, Ark.....	June, 1918
MATHEWSON BROS., Iowa.....	May, 1918
ED. HOLLAND, Queens.....	May, 1918
H. L. HASWELL, N. C.....	May, 1918
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W. H. COLLETT, S. Africa.....	Apr., 1918
G. F. BRACKETT, Wash.....	Apr., 1918
E. KOEPEKE, Wis.....	Apr., 1918
J. H. MARTIN MFG. CO., Ind.....	Apr., 1918
H. S. WAYNE, S. Aus.....	Apr., 1918
H. S. YONGUE, Wash.....	Apr., 1918
W. WELLSHAUSEN, N. D.....	Apr., 1918
W. H. CHIPMAN, Mo.....	Apr., 1918
A. P. STROBEL, N. Y.....	Apr., 1918
E. H. ALBERTY, Pa.....	Apr., 1918
J. R. JAFFRIES, Pa.....	Apr., 1918
R. COLVIN, Ind.....	Apr., 1918
J. LIPPETT, Ill.....	Apr., 1918
OTTO TIETZ, S. Africa.....	Apr., 1918
F. E. SMITH, N. Y.....	Mar., 1918
FLA. AG. & MECH. COL.....	Mar., 1918
J. V. FISH, Ill.....	Mar., 1918
H. J. FISHER, Mich.....	Mar., 1918
GEO. SMITH, N. Z.....	Mar., 1918
AUG. HOLZNAGEL, Ore.....	Mar., 1918
A. E. UELZING, Wis.....	Mar., 1918
J. C. YOUNG, Pa.....	Mar., 1918
D. C. HOUCK, Ohio.....	Mar., 1918
JOHN EYRE, Neb.....	Mar., 1918
A. E. DELANO, Me.....	Feb., 1918
S. S. STAPLES, Ohio.....	Feb., 1918
J. S. BOYD, Idaho.....	Feb., 1918
J. MOLITOR, Ill.....	Feb., 1918
F. P. FELLOWS, N. Y.....	Feb., 1918
J. W. STRADMAN, Ohio.....	Feb., 1918
J. P. HOLZAPFEL, Penn.....	Feb., 1918
E. N. GATES, Vic., Aus.....	Feb., 1918
RENTON WAGON Wks., Wash.....	Feb., 1918
WHITTING FTY. EQUIP. CO., Ill.....	Feb., 1918
J. P. KOENIGS, S. Dak.....	Feb., 1918
RICHARD BRENNER, Tex.....	Feb., 1918
W. F. HILL, N. C.....	Feb., 1918
O. O. GODERSTAD, Wis.....	Feb., 1918
M. C. BETTIS, Tex.....	Jan., 1918
P. SHIRMMAN, Cal.....	Jan., 1918
J. B. BETTEL, Me.....	Jan., 1918
W. MISCABLE, Queen, Aus.....	Jan., 1918
S. PORTERANCE, Que.....	Jan., 1918
D. C. FOLEY, Cal.....	Jan., 1918
GLEASON BROS., La.....	Jan., 1918
C. E. KRUG, Wis.....	Jan., 1918
G. E. WOODARD, Kan.....	Jan., 1918
P. J. DALLY, W. Aus.....	Jan., 1918
J. MORROW, Pa.....	Jan., 1918
C. W. MUNROE, Mass.....	Dec., 1917
O. HOGA, N. D.....	Dec., 1917
G. W. MILLER, Penn.....	Dec., 1917
G. M. SEYMOUR, Ill.....	Dec., 1917
J. TEMPLETON, Scotland.....	Dec., 1917
F. PROCTOR, Tas.....	Dec., 1917
J. G. JOHNSON, Ill.....	Dec., 1917
F. E. EGGERS, Ohio.....	Dec., 1917
C. T. FORREST, Cal.....	Dec., 1917
THEO. BUSH, N. Y.....	Dec., 1917
J. T. ELLIOTT, Ill.....	Dec., 1917
J. VOELPEL, Ill.....	Dec., 1917

NAME	Subscription Paid to
W. J. MAIN, Cal.....	Dec., 1917
J. G. LAUER & SONS, Mo.....	Dec., 1917
MES BROS., Victoria.....	Dec., 1917
E. BLOOMER, Aus.....	Dec., 1917
I. N. PITZER, Ore.....	Dec., 1917
W. A. REAGAN, Pa.....	Dec., 1917
H. P. ADAMSON, N. Zealand.....	Dec., 1917
C. E. REYME, N. Y.....	Dec., 1917
J. H. ROBERTS, Mich.....	Nov., 1917
G. E. BARTLETT, Wash.....	Nov., 1917
F. FROELICH, Tex.....	Nov., 1917
J. A. SHEPARD, N. Y.....	Nov., 1917
McMILLAN, HEAD & Co., S. Africa.....	Nov., 1917
C. ANDERSEN, Queens.....	Nov., 1917
J. KILGOUR, Scotland.....	Nov., 1917
F. R. TOMLINSON, Kan.....	Nov., 1917
KAYE & AINLEY, Eng.....	Nov., 1917
T. H. ZIEGLER, Wis.....	Nov., 1917
SCHOLLER BROS., Ind.....	Nov., 1917
E. M. WURSTER, Mich.....	Nov., 1917
S. Z. FREY, Ind.....	Nov., 1917
B. A. STRINKER, Ohio.....	Nov., 1917
J. N. BATHGATE, N. Dak.....	Nov., 1917
W. H. HOUGHTON, Pa.....	Nov., 1917
G. W. BOOGE, La.....	Oct., 1917
C. R. WALTERS, Ill.....	Oct., 1917
S. SMITH, S. Aus.....	Oct., 1917
W. STEPHEN, QUEENS.....	Oct., 1917
W. T. CUTKOMP, Iowa.....	Oct., 1917
GEO. POTSCHEK, Mo.....	Oct., 1917
J. W. RAPE, N. Y.....	Oct., 1917
W. C. RONEY, Pa.....	Oct., 1917
J. N. MILLS, Ky.....	Oct., 1917
C. L. THOMPSON & SON, N. D.....	Oct., 1917
EMIL PLATH, N. D.....	Sept., 1917
F. STAUB, Ohio.....	Sept., 1917
B. T. LARSON, Minn.....	Sept., 1917
H. SCHOONOVER, N. Y.....	Sept., 1917
PERFECTION SPRING CO., O.....	Sept., 1917
W. A. WILSON, N. Z.....	Sept., 1917
R. ROSS, N. S. Wales.....	Sept., 1917
I. E. SPROUD, Me.....	Sept., 1917
FRED. BLOHM, Tex.....	Sept., 1917
R. E. MATTOX, Va.....	Aug., 1917
C. T. WOOD, Kans.....	Aug., 1917
GEO. B. HEATON, N. J.....	Aug., 1917
CLARK & FAUSETT, QUEENS.....	Aug., 1917
C. L. HOCKETT, Cal.....	Aug., 1917
H. C. STENZEL, Tex.....	Aug., 1917
M. DEJAGER, S. Africa.....	Aug., 1917
F. HOWARD, Kan.....	Aug., 1917
H. FERREL, Ill.....	Aug., 1917
J. MCMEIKEN, N. Z.....	Aug., 1917
F. H. GIERKE, S. Aus.....	Aug., 1917
A. L. PITTENGER, Ill.....	Aug., 1917
F. SPINKS, England.....	July, 1917
J. P. KELLY, Md.....	July, 1917
F. G. STONE, S. Africa.....	July, 1917
H. J. DUVONSHIRE, N. Z.....	July, 1917
V. J. HUBBARD, N. Y.....	July, 1917
J. C. SKINNER, Viet.....	July, 1917
A. FASSNACHT, Tenn.....	June, 1917
H. A. CHEEVER, N. H.....	June, 1917
D. SHAFER, N. Y.....	June, 1917
W. R. GELLING, S. Africa.....	June, 1917
J. H. BAKKER, S. Africa.....	June, 1917
A. R. HALLENBECK, N. Y.....	June, 1917
F. C. BOCK, Neb.....	June, 1917
W. PRATT, Iowa.....	June, 1917
J. L. HUGHES, S. C.....	May, 1917
J. H. STINER, Ohio.....	May, 1917
C. A. STEBBING, Kan.....	May, 1917
W. S. SULLIVAN, La.....	May, 1917
H. SMITH, QUEENSLAND.....	May, 1917
P. VANDERHAGEN, Mich.....	May, 1917
YOST & HALVORSON, Minn.....	May, 1917
W. MCCOY, Kan.....	May, 1917
A. GUETTLER, Tex.....	May, 1917
C. F. J. LORENZ, N. Y.....	May, 1917
A. DATWYLER, Ohio.....	May, 1917
MADDEN & DAUSBERAU.....	Mass., Apr., 1917
H. DYRSSEN, S. D.....	Apr., 1917
S. G. FORMAN, N. J.....	Apr., 1917
A. OLESEN, Iowa.....	Apr., 1917
E. T. HOGMAN, Conn.....	Apr., 1917
O. F. MATSON, Utah.....	Apr., 1917
F. PETTIT, Okla.....	Apr., 1917
H. G. MARRIOTT, Utah.....	Apr., 1917
E. THIBAUDAU, Wis.....	Apr., 1917
W. PICKERING, S. AFRICA.....	Apr., 1917
ED. BURROWS, England.....	Apr., 1917
L. KAUSCH, Wis.....	Apr., 1917
J. M. BROWN, Tex.....	Apr., 1917
W. R. KIRKPATRICK, Ill.....	Mar., 1917
J. H. SISSON, Mo.....	Mar., 1917
T. W. WERKEISER, Iowa.....	Mar., 1917
A. HERZOG, Wis.....	Mar., 1917
L. E. BURNHAM, Me.....	Mar., 1917
L. C. VINYARD, Ore.....	Mar., 1917
C. B. GEIGER, Penn.....	Mar., 1917
M. PAULSEN, Minn.....	Mar., 1917
A. A. HOAG, La.....	Mar., 1917
N. F. ARENS, Mo.....	Mar., 1917
J. WEBER, N. Y.....	Mar., 1917
G. W. ROAT, Pa.....	Mar., 1917
W. E. MEAD, Mich.....	Mar., 1917
I. STAUFFER, Pa.....	Mar., 1917
D. J. SILVIS, Pa.....	Mar., 1917
G. SHOENAKER, Pa.....	Mar., 1917
P. PFISSEFFER, Ore.....	Mar., 1917
W. WATSON, Vic.....	Mar., 1917
W. BAGLEY, Mass.....	Mar., 1917
B. E. CAMPBELL, Mass.....	Mar., 1917



Honesty and Truth in Your Trade Paper

ELBERT HUBBARD

It is a somewhat curious fact that in many daily newspapers a wide gulf exists between the reader and the advertiser.

The newspaper may advertise clairvoyants, fortune tellers, palmists, astrologers, fake remedies and fraudulent financial schemes, and the subscriber does not wink an eyebrow.

But let a Trade Paper advertise a machine of problematic value, and the editor would have the subscribers right on his back.

It is assumed by the readers of a Trade Paper, that the editor knows every advertiser and is familiar with his products. If not, he should be, and, as a matter of fact, he is.

And this confidence of the subscriber has a deal to do with holding the editor to his task.

A great many magazines publish anything that "listens good," and the publisher hopes it is all right. If it isn't all right, he doesn't want to know about it, and isn't thankful when he is told.

With the Trade Paper, the editor cannot countenance "explosives" in his ads. If he does he loses subscribers and if he hasn't subscribers he cannot expect advertisements.

And without advertisements he cannot produce the best paper.

For the wise subscriber prizes the Trade Paper on account of the fact

that it advertises the machinery and the goods he needs, and also tells the truth about them.

It will thus be seen that editor, advertiser, and subscriber, occupy a close triangular family relation.

Their interests are mutual. If the Trade Paper did not help the subscriber up the incline plane towards success, it would not and could not exist.

"Each for all, and all for each" is fast becoming the universal slogan. "From every man according to his ability; to every man according to his need," is the new evangel.

There is no such thing as distinct interests, apart from each other.

The manufacturer needs the miner; the miner the manufacturer; they both need the farmer; and we need them all.

One may be a hewer of wood or a drawer of water, another a captain of an industry. One may be a toiler in the valley, and still another in the observatory on the mountain top, reading the signs of the times. But their success hangs upon their co-operation—their reciprocity—their interrelation.

True progress is only possible where there is mutuality and co-operation—where we see the seeming paradox of individual liberty harnessed to the car of common weal.

The principle of alternating motion is as applicable to the life of the individual as it is to mechanics.

We grow by giving. Power comes from knowledge. Knowledge is absorption and ejection—taking in and giving out. It is a process of interaction.

Thus we get to know each other, to understand the differences of individual, inimical, and communal interests—to have confidence and to combine.

This is the foundation principle upon which we raise the structure of social and commercial prosperity.

Business is now done right out in the sunlight. Publicity is the salvation of both dealer and consumer.

The buccaneer is banished from business.

The wise business man realizes that according to the quality of his goods, so will his business prosper.

And the customer, recognizing

that the business man knows this, and proving by actual purchase and test that he lives up to his principles, gives him his business.

I have said that we are breaking away from distrust of our fellows. That is true; but we still find people whom it is a task to induce to believe this.

The vast majority of people, though, see that the man who advertises his wares or service as "quality," must produce them—else his successful days are numbered. And if he provide wares that fill the bill, then he and they benefit.

No good Trade Paper will publish punk publicity.

Your Trade Paper is a publication wherein can be found ideas, plans and information.

The reason is that its subscribers are alert and progressive—alive to their possibilities and to the good things in the world of science and invention.

I know no better medium for the exchange of ideas than your Trade Paper.

Its pages bristle with interesting facts, and pulse with intense humanism and understanding.

The task of the advertiser in your Trade Paper is made a pleasant one by reason of the intelligent receptivity of the subscriber.

The subscriber and advertiser recognize the benefit of business reciprocity, and fully appreciate the friendship based upon it.

They know each other's needs—that they need each other for their individual growth.

They acknowledge the distinct services to each other.

Whether you call this sentiment, or something else, yet it is the very essence of success; producing results otherwise unattainable.

Your Trade Paper has made giant strides. Its intimacy and strength with its subscribers and contributors are remarkable. But its greatest achievement, to my mind, is the creation of a bond of sympathy, mutuality and understanding between its subscribers and advertisers that is unique.

And we do business with our friends—our enemies will not trade with us anyway.

(Copyright, 1914, Koonal Adv. Service)



A Simple System of Keeping Track of Every Item

(Arranged by the Information and Research Division of the Burroughs' Adding Machine Company.)

A blacksmith in seeking the facts about his business found that one of the greatest sources of loss in his shop was through failure to charge the customer with goods sold on credit. This smith used the charge book—often called the day book—in which the charge sales were entered by the man making the sale.

He found this method rather unsafe, for two principal reasons. Often in a rush a man was obliged to wait upon two or three customers before he had time to go to the charge book, and the details of one of these transactions were very apt to be forgotten. You know, yourself, how easy it is to forget details under stress of a busy morning in sharpening time.

He found this method unsafe for another reason, because he had no positive check on the records in the charge book. If a customer disputed a bill he could only refer to the entry made in the book and, after all, it was merely his memory or that of one of his men as against the customer's. And as customers seldom kick because bills are too low, he almost invariably lost when he had no positive proof of the accuracy of the amount charged. He could not afford to argue with a customer and take the chance of losing his trade.

There are a great many smiths who are up against the same proposition. There is a remedy for this trouble.

The duplicate-sales-slip method of recording transactions has not been adopted by many smiths, because they feel that it takes too much time and too much work to sort the slips, and because they think it means duplicating effort, since many still enter all items on the monthly statement blanks.

Wouldn't it be worth while to have a system which takes no more time than the old way—in fact, it can often be done in much less time—which will do away with all cause of complaint on account of overcharges and will insure the proper charging of every job which goes out of your shop?

Provided with a book of sales

slips, numbered consecutively, you make an original, and a duplicate (which is made in carbon copy) record of the transaction, and both slips bear the same number.

When a customer has a job done which is to be charged, you write the order in this book, and tear out the original which you give to the customer.

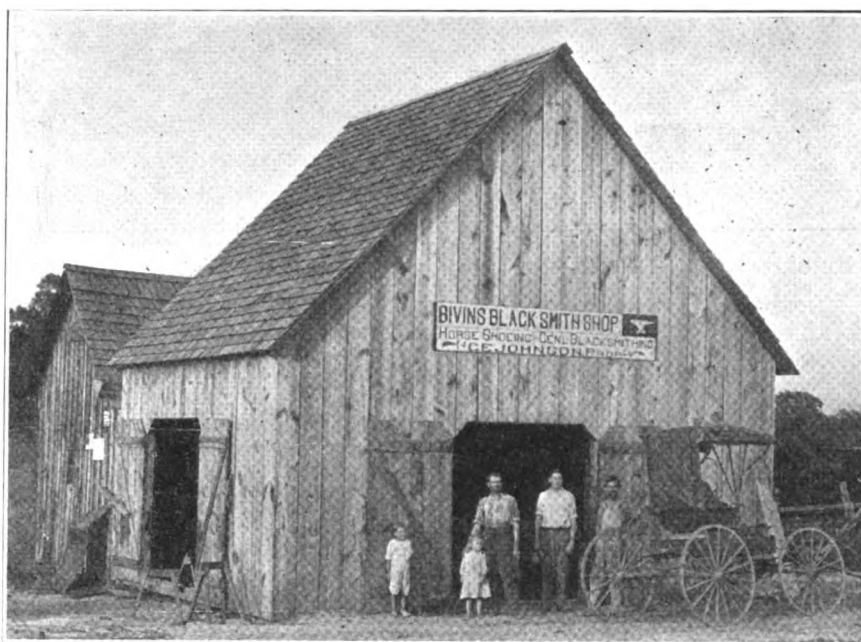
It is a matter of but a few minutes to run through the totals on the various slips, after which the total charge business for the day can be obtained.

There is no need to enter the separate items on the customer's ledger page, because you have the original

those pages designated by markers and make a list of all postings. This will take only a small fraction of the time which would have been necessary had you entered every item in the ledger. The total postings will agree with the total charge sales (previously made) and will prove that every charge has been properly made to the ledger.

Wrap the day's sales slips in a package or slip a rubber band around them. Mark them with the date, conspicuously, and file on a shelf or in a filing cabinet until the end of the month.

You now have a record of every charge transaction during the day,



A TEXAS GENERAL SHOP OPERATED BY MR. C. E. JOHNSON

entry on the duplicate sales ticket.

With the day book it is necessary to copy every item into the ledger, because the original entries cannot be found without a long search. But when the sales tickets are numbered, and filed by dates, any original entry can be found almost instantly.

On this ledger page is entered the date, the number of the sales slip, and the total amount. (Remember that the customer has an exact copy of the sales ticket from which the entry is made.)

Whenever you make a posting, drop a marker into the ledger, opposite the page, and proceed with the next posting.

When through posting, turn to

and the work is done so far as they are concerned.

This process is repeated for each day's sales as they are made, the bundles of original sales tickets being filed by days in numerical order.

Making Out Monthly or Weekly Statements

At the end of the month the statements are made up. List the dates in one column, and list and add the amounts in the other column. Simply copy the entries from the ledger.

Place the statement between the pages of the ledger, just as the marker was placed when you were posting.

When the statements are all made, turn back to the first and compare the items with the ledger postings. If they correspond, write the total



in the ledger, thus doing away with all mental addition. The items will always correspond, of course, unless you made a simple mistake in copying.

Fill in the customer's name on the statement head, and the statement is all made, and proved by the ledger.

Advantages of This System

It can be used either with single entry or double entry, and assures you that you have a record of every transaction.

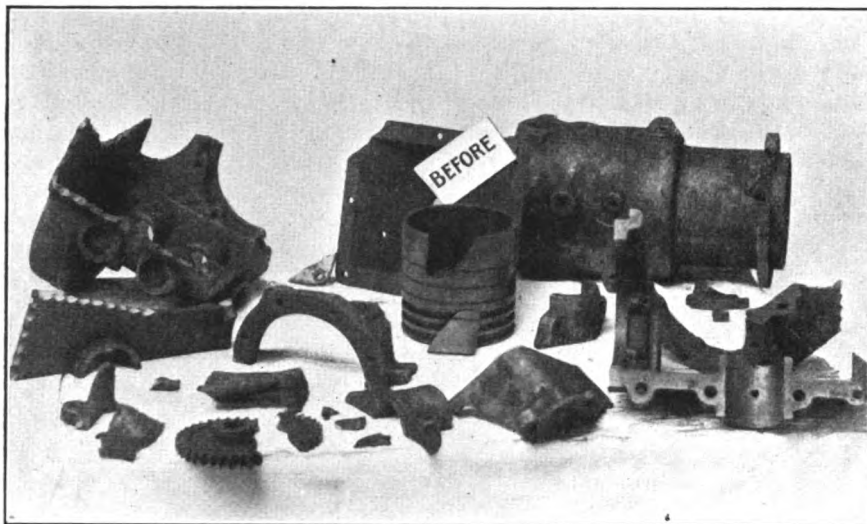
It gives the customer complete details of every purchase.

It gives a complete check on every

friend to be responsible for all goods or work furnished, up to a certain sum.

In other cases the thing is done after a customer has been given the credit and when he is behind in his payments. As an inducement to further credit, or in order to stave off legal proceedings to collect, some friend is brought forward and offered as security.

The question is, how can the security be bound hard and fast so he can be held without any escape? Read this letter:—



THE BROKEN EDGES ARE GROUND SO AS TO LEAVE A V-GROOVE WHEN PUT TOGETHER. THE PIECES ARE WELDED IN SPOTS TO HOLD THEM IN POSITION. THE LARGE PIECES BEING PREHEATED AND THEN WELDED BY MEANS OF OXY-ACETYLENE

When the customer gets the statement, he compares the items with the originals of the sales slips which he has taken or which have been sent with the goods. Any error can be quickly rectified by referring to the duplicate slip which is on file at the store.

Some smiths furnish their customers with a hook, or clip, bearing the advertisement of the shop, on which these slips may be filed as soon as received.

When the customer pays the bill, it is entered in the cash book and posted to the ledger.

Many customers pay bills in person at the shop. In such a case you can make use of a duplicate receipt book, containing slips like the form illustrated, in which the receipt is written, the original handed to the customer and the carbon duplicate retained in the book. These books must be turned in every day and the money accounted for.

Proceed with these duplicate receipts in exactly the same way as with the duplicate sales slips.

The use of a duplicate receipt book is also useful in keeping trace of C. O. D. orders.

posting to the ledger and assures you that you have a record of every transaction.

It saves copying every item from the charge book to the ledger.

It saves the toilsome footing of ledger balances.

It gives a complete record of the business done.

It insures the receipt of all money paid on account or in settlement of bills.

It saves good ledger paper; as a customer's account can be kept on one page for a year.

When a Third Person Agrees to be Responsible for a Customer's Debt

Here is a query from a firm in Minneapolis, Minn. The problem submitted is a common one, shared, it might be said, by almost all business men at one time or another without regard to line or size. The particular question submitted probably touches rather a small matter, but in principle it is identical with every case where a business man attempts to induce a third person to become security for a customer's debt. Sometimes the thing is done at the beginning of a customer's relations, when he has asked for a line of credit, but on his own merits would not be able to get it. In such a case it is customary to get some

We have a customer who was trading with us for some time. His account grew larger and larger. We demanded settlement. He was not in a position to do anything. One day one of the members of this firm called at the customer's place in order to see what could be done in regard to the account, and it happened that his parents were there also. Now, the mother of this customer said she supposed they would have to help them out in settlement of their account. This statement was made in the presence of one of the members of this firm. We continued the account until it got to what we thought was the limit. Some time later the customer, in company with his father, happened to meet this same member of the firm to whom they had previously promised to help their son in the settlement of this account. This time the father made a statement expressing his thanks to us for helping his son out and making a declaration to this effect, "You shall not lose one cent of my son's account." We again continued the account, as their parents are well to do. Some time ago I wrote the father a letter, reminding him of their promise and asking him to make a payment as we were in need of money. In his reply he denied that he had ever made such a statement. Are we in a position to do anything, as we continued the account on their express promise to help their son out?

If this correspondent, when he talked with the father and mother of his customer and granted more credit on the strength of what he supposed they were promising, had had the knowledge which he will have after he reads this article he could have absolutely protected himself, probably both as to the old account and the additions to it. At least he could have saved himself any loss beyond the first loss.

My judgment is that if this father and mother wish to avoid payment of their son's account they can easily do so. This correspondent has not in my opinion the slightest legal claim upon either of them, although without doubt he has a moral claim.

When a third person offers to become responsible for another's debt, two principles must be present or his promise is worthless and cannot be enforced against him.

First.—His promise must be in writing. This is so everywhere, under the laws of all States.

Second.—The debt of another, for which the third person is said to have agreed to stand, must be clearly identified—it must be apparent what debt the third person meant when he made himself responsible—and the third person's promise to pay it must be unqualified and unequivocal.

Now let me apply these principles to my correspondent's case and see what becomes of it. To begin with, he has nothing in writing. All that he has is two *verbal* statements. Even if the statements amounted to absolute and unconditional promises they would be worthless because they were not in writing.

But the statements made to him were not promises at all. "I suppose we shall have to help him out," spoken by the mother, is faulty first because it stops far short of promising to pay the debt, especially that part of it which was contracted *after* that; and second because even if good it has no power to bind the father—probably the only one financially good—since it does not appear that he at that time consented.

Likewise the father's so-called promise—"you shall not lose one penny of my son's account." That is not an agreement to pay the debt himself; the father might easily



say "all I meant was that I should keep after my son until he paid it."

Both this father and the mother stand absolutely free from any obligation which can be enforced against them, even though this correspondent granted additional credit on the strength of what they said.

Let me suggest now what the correspondent and all other people in the same position should have done to tie the father and mother up so he could hold them now. As soon as the parents showed interest in the case he should have asked them bluntly whether they would agree to become responsible for the debts already incurred if he would grant their son more credit, also if they would likewise guarantee the payment of bills to be incurred in the future. If they said yes, they should have been asked to do so in writing then and there. If they said no, the correspondent would at least have known where he stood, and could have avoided further losses. If they had agreed to become responsible for the new debt, but not for the old one, it would have been for the correspondent to decide what to do from that standpoint.

The rule can thus be simply stated: Get the person who is offered as security to sign a paper agreeing to be responsible for the debt and describing what the debt is in the clearest possible terms. Such a paper should not agree to pay the debt, "if A does not," because you must then first go after A and sue him and get judgment before you can approach the security. A better wording would be "in consideration of B & Co. furnishing and delivering to A the following merchandise ——— I hereby agree to pay for same when same is due." That makes it the primary obligation of the security, and you can go after him without bothering with the real debtor at all.

(Copyright, by Elton J. Buckley)

Blacksmith Inventor of Straw Carrier, Dead

Daniel Murphy, who died several months ago at Ida Grove, Iowa, was an inventive genius besides being a good blacksmith. In addition to the automobile starter upon which he had obtained a patent just a few weeks before his death it is now known for the first time that it was through him that the swinging straw carriers for threshing machines were placed on the market. At the time that he figured out the straw carrier he was a resident of Dubuque County, and at that time had been compelled to quit his trade and was engaged in farming. He built the carrier, attached it to a machine manufactured by John Deere and it was afterwards adopted by the John Deere Company and other manufacturers of threshing machines.

Mr. Murphy's genius found expression in other inventions and mechanical devices, but he seldom took pains to secure patents and appeared to care little for financial rewards. He was not only one of

an inventive turn of mind, but was a great lover of music and literature. Although 80 years of age he had a good memory and could readily recall historical, political and current events. He had in his possession at the time of his death a violin of rare old age; it being presented to him by a grand-uncle who came into its possession through a relative of a previous generation, and it has a tone of great sweetness and melody. Mr. Murphy was the father of nine sons and one daughter.

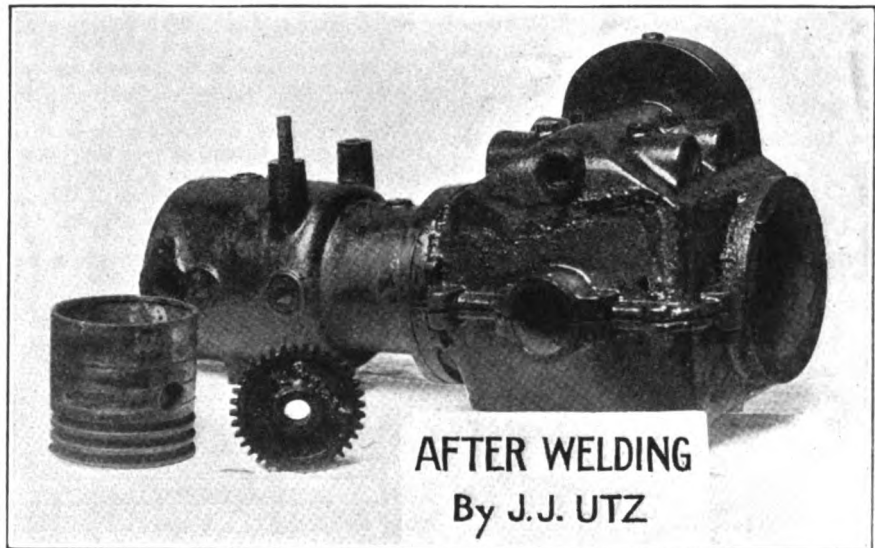
A Discussion of the Piece-Work System of Doing Work

GEO. P. WHITE

Piece-work enables a foreman to estimate the cost of work, and length of time that will be put in to prosecute such work, within a very small margin, for the workmen are after the

ceived for this work. Then he would know the cost of each item, and also the number that each workman would make. If it should come about for some reason that the company wanted this work several days ahead of the specified time it is a very easy matter to push the work somewhat faster in a piece-work shop than in a day-work shop, for when the workmen can see that their pocketbooks will benefit, they will strain every effort to get just a little more out of each day, and they will not hurt themselves, either.

We have often heard the remark in a day-work shop, and possibly in some piece work shops, that the foreman is not going to kill himself by crowding the work or that he is not going to work his helpers to death. When I first became a foreman I was cautioned by an elderly instructor of mine never to ask a man under me to do something that I would not do myself. I have found



THE PREHEATING SAVES GAS AND ALSO PREVENTS THE CRACKING OR WARPING OF THIN PARTS. MR. J. J. UTZ SPECIALIZES IN THIS WORK. HE IS LOCATED IN ILLINOIS

money, and know that it depends upon what kind of a day's work they put out as to the amount of wages they will draw. For instance, suppose we have orders to build 500 cars of a given design. Knowing that our material is in stock and that we have the drawings to work from, our first line-up would be to get out the forgings for the bottom, then the bodies and the trucks. A foreman in a piece-work shop should be able to tell within a day as to when certain forgings will be re-

this to be a great motto, for it works fine in all instances.

Besides piece-work, there is what is termed premium work. This insures the men making a certain amount of wages each day, with the privilege of making more by a little hustling each day. Yet in a great many instances it is similar to the regular piece-work, for there is a certain price set on each article, and should the workman make twenty per cent more of a certain article than was required to make

his standard day's wages he would receive twenty per cent more wages for his day's work. One great difference between piece-work and premium-work is the time a workman will draw his wages for the work. Nearly all companies have a set day—termed “pay day.” On premium-work, the workman would draw his wages in full to the specified time, but on piece-work, should he have a certain job about half finished, he would only draw a percentage of his wages for this work; the remainder being held over until the said work was completed, or on the next following pay day.

In addition to piece-work or day-work, one of the greatest advantages is to specialize the work. This will gain more than any point that I know.

We work piece-work on new and repair-work. Wherever there is piece-work the output is greater, and that is what we are looking for. Some say under the piece-work system you get an inferior grade of work. I don't think so. If a man does a job which will not pass inspection, send it back to him and let him do it over on his own time; he will soon begin to do his work right.

Under the piece-work system, the foreman has got more time to look

after his other duties, because if a man gets out of a job he will hunt up the foreman instead of the foreman having to watch him. He will also take better care of his tools and have them ready for the next job. If your prices are fair, piece-work is the best way of having work done.



Queries- Answers- Notes

Another Business System.—I have been very much interested in the articles on costs, accounting, bookkeeping, etc., in "Our Journal." I use a system that may interest others, and am pleased to submit sample forms or blanks, so other readers can see how I keep tabs on my business. The large sheet, marked Fig. 1, is divided for the several items as per the book entries. I use one or more of these sheets for each day. At the beginning of the day I write the day and date at the top of the sheet, and at the day's end I place the sheets in a bill file where they can be re-

ferred to when necessary. When posting accounts in the ledger and when putting down charges, I enter only the complete amount or the entire job cost. If an itemized bill is necessary, I send it out with the job; using a book of loose-leaf sheets, as per Fig. 2. On sheets of this kind I also keep a record of the labor and material connected with each job.

E. M. CUNNINGHAM, Maine.

Improved Feeder for Acetylene Generator.—I have just built both the generators and welding torch for my oxy-acetylene welding outfit, and they work fine. I can do a little work, and am improving daily. I have had a little trouble with feeder on acetylene generator, so I changed its construction. In place of the plunger and disc I used a common two-inch auger to fit the two-inch nipple, trued the shank down to fit the packing gland and put on an adjustable auger handle. With a few turns of the auger I can bring the pressure up right to the working point. The oxygen generator works fine. I use a plumber's gasoline furnace for generating my oxygen.

W. F. BURDELL, South Carolina.

"Magnesite."—I would like to receive information regarding the magnesite to which Mr. Waychoff refers in his article describing the construction of a welding table.
H. LAMBRECHT, Illinois.

H. LAMBRECHT, Illinois.

In Reply.—The "magnesite" which Mr. Waychoff mentions in his article in the December number is more correctly known as "magnesia." It is a white powder, absolutely infusible and non-volatile. It can be purchased from the druggist, or better still from a plumbing contractor who installs steam heat outfits. He uses it to make a protection around the pipes. It should not be expensive from him.

The object of mixing the magnesium chloride solution with the magnesia is to make the powder pasty and then, when moulded, to be hard. When drying, it should be placed in a warm, dry current of air, to have the moisture leave it as quickly as possible.

H. M. K., New York.

A Word from South Africa.—I find your paper of great value, as it certainly contains useful information to the trade in general. The articles on cost and selling price should be thoroughly read by all our people. Ignorance in regard to the cost of production, and cutting prices, are two of the greatest evils our trade is subject to; and only too many of our competitors seem to have the idea that "If Jones can do a job for a certain amount, I ought to be able to do it, also, and even a little cheaper." The fact of whether "Jones" is making it pay or not is never taken into consideration. We should adopt a system of cost and price whereby we will reap a profit that is fair to ourselves—never mind the other fellow's price. A. GRAY, South Africa.

A. GRAY, South Africa.

Repairing Buggy Wheels.—I would like to see an article on repairing wheels. I often have buggy wheels requiring the spokes to be drawn and wedges inserted in the hub—requiring shaping up. They are wheels with a great deal of dish in them. I would like to see an article from start to finish on a job of this kind. Occasionally I have difficulty in getting the spoke tenons in line with each other for receiving the rim. I put in a wedge at back to fill in the mortise up tight, and very often the spokes do not line with each other when driven in. I do not use glue, because if I drive in a light spoke and it does not line up it is no good. They are all staggered hubs. My work has been chiefly shoeing until lately.

CASH RECEIVED		CASH PAID	
		BILLS RENDERED	
ACCOUNTS CREDIT			
ACCOUNTS CHARGED			

HOW MR. CUNNINGHAM OF MAINE KEEPS TABS ON HIS BUSINESS



Our country is being cut up for farming work, and so my work is getting more and more mixed. C. PRUST, Australia.

In Reply.—The article on "Crooked Wheels" in this number will give Mr. Prust some information that will help him in his difficulties. For spokes that do not

Warren, Me.....191

M

To E. M. CUNNINGHAM, Dr.

**CARRIAGE AND MACHINE SMITH
WHEELWRIGHT AND WOOD WORKER**

Being in need of the services of a good smith we inserted the following advertisement in our local paper:

"First-class agricultural smith, used to cultivator or wagon work; top wages; three months' work.—Shepherd-McDonald, Bute."

One of the replies received read as follows:

Adelaide, Feb. 16, 1914.

"Mr. McDonald

Seen your advertisement to Day you wanted a Shepherd as i am one, last job whithe Will Hawker Should i suit please state wadges adres C. H. REFFKE."

Perhaps the readers of "Our Journal" may be interested in this humorous little incident.

SHEPHERD & McDONALD, Australia.

A Shop-Made Disc Sharpener.—The accompanying illustration shows an emery grinder and disc sharpener that I made. The efficiency of this sharpener lies in the fact that the machine can be started and then you can go to work at something else. It requires about eight minutes to grind a disc with a 1-inch bevel. In the illustration, A is a gas pipe, $1\frac{1}{4}$ by 10 inches long, and B is a bolt, $\frac{1}{2}$ by 12 inches long, that turns in the gas pipe which is babbitted to fit the bolt. C is an eyebolt that holds the pipe firmly to the wooden arm (2 by 4 inches). D is an adjusting nut on the eyebolt that slips on the pipe, A, and extends through the block of wood. This allows adjustment for the bevel of the disc. A nut, E, allows adjustment on the tension on the spring to permit holding the disc as tightly to the emery wheel as you wish. This spring also allows the wheel to follow the irregularities in the disc.

L. C. WHEELBARGER, Kansas.

A Vermont Letter.—I have read the "Blacksmith's Delight," as I call THE AMERICAN BLACKSMITH, for about four years. I look forward to the coming of

the next issue as eagerly as some people look forward to their next meal. I have been in this place almost seven years and have had to work up a trade. I now have a new shop, 27 by 40, of two stories. I also have a five horsepower gasoline engine, an emery wheel, a band saw, a buzz planer, a bench saw and a drill press. I have this equipment so arranged that every machine can be run at the same time if desired. I would not want to get along without power, and believe I would have to give up doing business were I obliged to.

I have read considerable about interfering horses, and want to say that I always pare the foot or feet as level as possible and then see about the amount of iron the limbs are strong enough to carry. I believe in shoeing the horse properly at all times. I am a young man, and consider that I have still a great deal to learn. So far I have been quite successful in my work, and some of my customers come from a distance of twenty miles.

SAM LECLAIR, Vermont.

Water on Coal.—In reply to the well written and well discussed article by Mr. James Cran, in the March issue, I take exception to one point and would like to ask Mr. Cran why he puts water on the coal with which he builds a bank fire or fire for heavy work. The water is of no benefit, he says, and he has never been able to find out why smiths soak their coal in water unless it is because they have become accustomed to it. Now, the reason for moistening the coal with water, in my opinion, is that it helps to rid the coal of impurities, such as dirt, sulphur and any other foreign matter that it may contain, which is very naturally detrimental to the success of getting a good fire or weld. The coal will coke very much easier and better after it has been dampened and it will pack much closer. Dry coal will not pack readily. Of course, fresh coal that has been mined a short time before using will coke,

line-up he should use a device (several designs of which have been described and pictured in "Our Journal") which will enable him to pull the spokes into line when he puts on the rim or fellow. Also, if Mr. Prust will drive his spokes in glue he will get better results. E. E. A. New York.

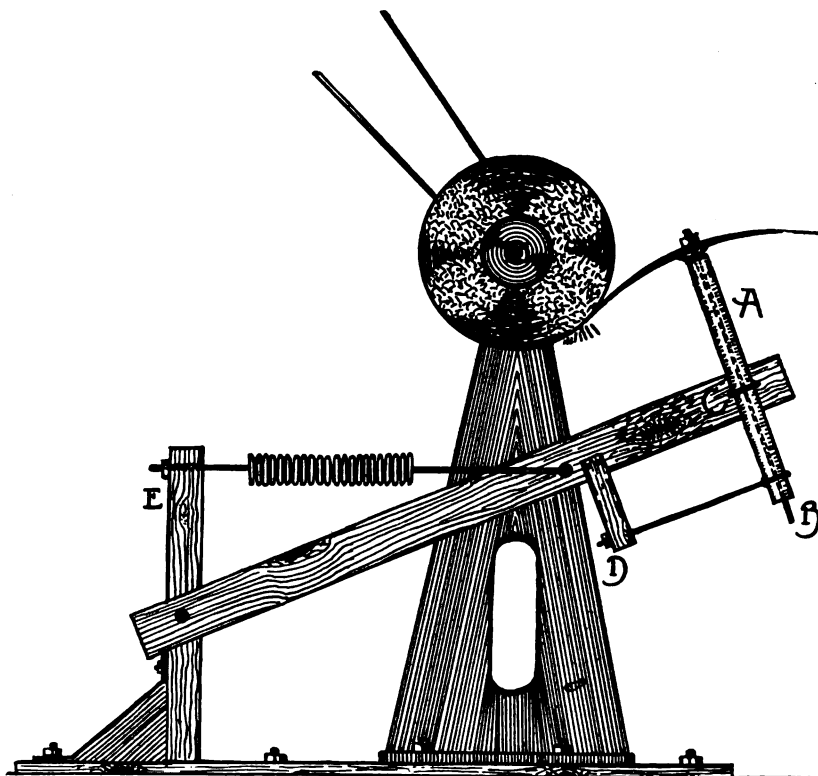
A Western Branding Iron.—I enjoy reading the letters from various parts of the world, and regret seeing none from my own part, so I will take this opportunity of sending a few lines from Oregon.

The March number contains an article from Harry Bell of South Africa on the welding and making of branding irons. As I have had quite a little experience in this line I will tell how I make the figure 8. Of course this depends upon the size, but, ordinarily, cow irons are made of $\frac{1}{2}$ by 1 inch (I use soft steel) stock and from $3\frac{1}{2}$ to 10 inches in size. Take a piece about 10 inches long, heat and hammer one side to an edge of about $\frac{1}{8}$, then weld your handle in the center. Heat one end of brand to a good heat and bend it on the horn of anvil until the end hits the place where handle is welded on; making an egg-shaped figure. Then heat the other end, bend in opposite direction and weld. This will make an iron of about $4\frac{1}{2}$ inches, and if your handle is heavy enough, and if a large V-notch is filed in the center, you have a good iron.

I would like to hear from some brother who has had experience in making plowshares, in cutting the share out from the bar of steel so as to make a perfect point, and also the heel of the share.

MARK JOHNSON, Oregon.

Some Australian Humor.—The following humorous incident, which we recently experienced, may be of interest to your readers:



AN EASILY-MADE DISC SHARPENER THAT WILL HELP IN A POWER SHOP



and without any moisture. If a fire were to be built as shown in Mr. Cran's illustration (Fig. 2) it would be necessary to dampen the coal. The reason I sprinkle water on the fire is to make it last longer and to throw the heat to the center where it is required when making a weld, and in this way I also find that I can get a much cleaner fire. I am young at the business (having worked only 33 years at the anvil), but I am still learning.

C. W. METCALF, California.

A Shop in the Southeast.—When I started in this business, fifteen years ago, I only had fifteen dollars' worth of tools and a few dollars' worth of material. I did my own work. My shop then was 16 by 18 feet. Now I have a shop for my iron-work, measuring 25 by 40 feet, and one for my woodwork, measuring 20 by 65 feet (two stories), with a shed on the side. If space permitted I would have more buildings. I now employ four men and two helpers and can scarcely keep up with the demand for work on busy days. Two of my men have been with me almost since I started in the business. They endeavor to please my customers and are, therefore, working for my interest. My blacksmith and horseshoer is one of the best in his line. I receive work from miles around for him to do. My main woodworker has been with me for ten years and has the confidence of my customers. I try not to allow anyone to accuse me of two things: first, that they cannot get their work when needed, and second, that I do not charge the proper amount. I find that good work and a fair price is the best policy in the long run. My work per day amounts anywhere from \$12 to \$450. Of course, I do not count work until delivered. For instance, when I have completed a steel cage for \$450 (which I work on at extra times), I credit the amount with the day's receipts. For the last cage I built I received \$400. How is that for a blacksmith shop "down south"? I build these steel cages for the county gangs. I also build timber carts and log wagons. I make stalk cutters from my own patent and do

all kinds of repair work on autos, buggies and wagons. I run two forges regularly and have one for use when extra work comes in. I have a planer and rip saw, also a wood lathe. These are propelled by a gasoline engine. I contemplate installing two more machines—a small iron lathe and an oxy-acetylene blow torch.

J. T. WILSON, South Carolina.



The Automobile Repairman

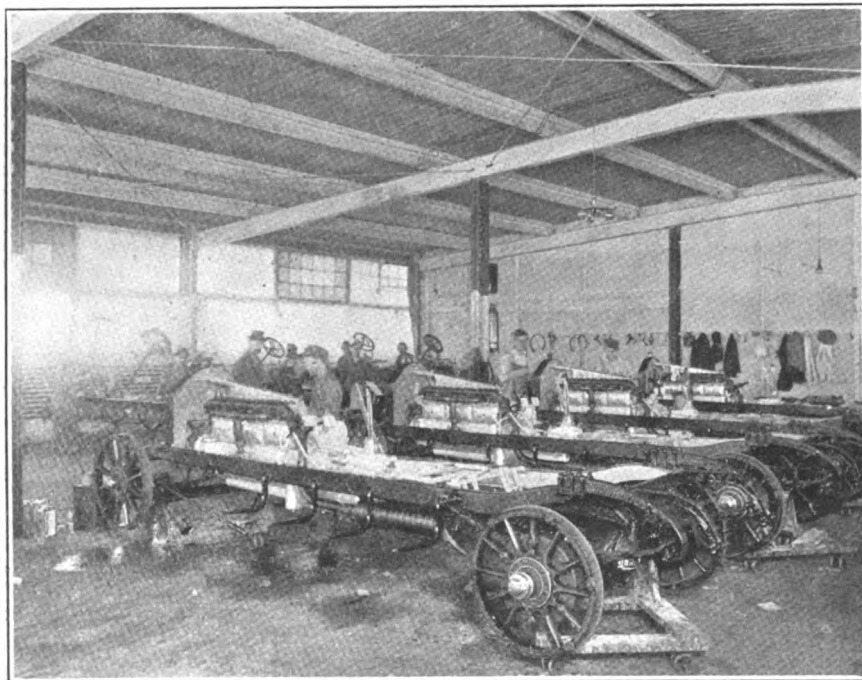
Brass may be made black by a solution of carbonate of copper in ammonia. This is made by dissolving sulphate of copper in hot water and adding strong washing soda to it as long as a precipitate forms. The clear liquid is poured off, hot water added and the clear liquid poured off again. When a pure mass is obtained, by repeating this a number of times, liquid ammonia is added and a clear deep blue fluid is obtained. The brass is allowed to stand in it until the desired depth of color is attained. It is well to boil the brass clean before starting to darken it; using for this purpose a strong solution of potash.

Motor car fuel cost.—It is said that there are approximately 1,000,000 automobiles in use in America alone, and it is estimated that each will average 5,000 miles a year; making a total of 5,000,000,000 miles traveled by motor cars in America in a year, which is equal to going around the world approximately 200,000 times. Figuring the average miles gotten out of a gallon of gasoline for all sizes of cars to be ten miles per gallon, it will take 500,000,000 gallons of gasoline to run the motor cars in America, which, on a basis of twenty cents per gallon, would make the gasoline bill of America's motor cars in a year, \$100,000,000.00.

The optical part of motor lamps, whether of the acetylene or oil variety, should, of course, be kept in a high state of cleanliness. Everybody will admit that a perfectly polished reflector or a thoroughly cleaned lens or mirror gives a higher luminous efficiency than is given by a tarnished or improperly kept device. Silvered reflectors should be cleaned lightly with crocus powder and then dried with a chamois skin. Reflectors of brass are cleaned either with a liquid or paste polish, of which a great many are upon the market; no acids of any kind should be used, and the polish should not contain any coarse grains, as these will scratch the reflectors.

It will be found that many back axle cases have a screw plug at the bottom of the differential case, so that the procedure of swilling with kerosene can easily be carried out, but it is, of course, best to jack the wheels up and turn them round by hand a few times to stir up the kerosene and the oil before letting out the mixture. As a rule, back axles want very little grease, and a good thick oil is all that is required, and it is much better to put in a little and often than to put in a large dose at one time, as the oil works its way along the axles and then back along the wheel hub out on the brake drums, whence it badly splashes the tires on the inside. However, very few back axle cases have any means by which the user can tell whether he has put in sufficient oil—and a careful man likes to be on the safe side—so the only thing to do is to put in enough, and then, if it comes out on the tires, to let out a little through the screw plug. Very few back axles require more than about three pints of oil, though in warm weather it is just as well to put in two pints of oil and about the equivalent of another pint pot full of grease. Some makers will inform the owner, on application, how much oil and grease should be applied to the gear box and back axle, but a good many do not seem to know, though, of course they know how much it takes to fill a crank chamber to the proper level. On chain-driven cars, where the countershaft is away from the change-speed gear box, the treatment should be the same as for the back axle.

An effective way in which to cover up grease cups or the small oil cups which are used in such parts as steering knuckles and connections, spring shackles and rear axles, so that they may be kept free from the dirt and mud which almost invariably accumulates on them, and is likely to be carried through into the bearing with the grease or oil when the cup is filled, is to procure a number of hollow rubber balls, of just such size that the cups will fit within them, and to enlarge the holes so that they may be forced over the cups and get a tight grip on the bottommost parts. The balls will make absolutely tight coverings for the cups, and if they are painted



THE ASSEMBLING FLOOR OF A HIGH-GRADE AUTOMOBILE FACTORY



the color of the car, they do not by any means detract from its appearance.

For cementing glass or glass and metal, as for automobile lamps, a cement not affected by oils is made from: lead, 3 parts; tin, 2; bismuth, 2.5. This melts at 212 Fahr.

Heating the fuel.—One of the latest innovations in highspeed combustion engine construction is a device for heating the air admitted to the carburetor by means of an electric current, and inasmuch as this heat can be maintained at all times, it should prove a fuel-saving affair. A six-volt battery furnishes the current to heat a series of resistance coils installed in the carburetor intake pipe, so that immediately the motor is turned over after the current has been on for a moment, hot air is admitted; thus assisting in volatilizing the gasoline and preventing an accumulation of heavy fuel in the manifold, preventing further firing and consequent stopping of the motor, which sometimes occurs when the temperature is low. The device is so made that it can be installed easily by anybody in a short time.

The most insidious enemy of a ball bearing is rust. Were it not for the extreme accuracy of the balls themselves (which are rejected in some factories if they vary from a truly spherical shape more than one ten-thousandth of an inch), and the beautifully lapped and polished races, they would not be capable of annihilating friction to the extent they do. And also, if less care were exercised to ensure the precision attained, there is but little doubt but that troubles would continually arise; and a fair criterion of this may be noted in the damage which a trivial amount of rust will engender. Once let rust attack the polished surfaces of balls or races, and the corrosion will soon result in destruction of the bearing. For this reason, ball bearings should never be run dry; grease and oil not only act as lubricants, but also prevent rust attacking the steel. The oil used, too, must be perfectly free from acid, as this will corrode the bearing. Hubs are best stuffed full of vaseline, because this helps to keep out damp, and as these bearings revolve comparatively slowly in the road wheels, a thick lubricant answers just as well or better than a thin one. It may be taken generally that the lighter the load and the higher the speed, the thinner should be the oil which is used for balls.

The transparency of celluloid windows, as in tops, may be restored by acetone varnish.

A clogged vent pipe and what happened.—We were walking along the street recently when we were startled by what seemed to be the sound of a pistol shot. Nearly everyone rushed in the direction from which the sound came, expecting probably as were we, to find some world-famed capitalist the victim of an assassin's bullet. As we hurriedly turned into a side street we saw the crowd thickest about a big limousine. "Shot in his car," we thought and elbowed our way along. Soon, those who had reached the scene of the "tragedy" first, worked their way back again, the tense looks on their faces gone and in their places—were they really smiles? Curiosity and a strong interest in anything in which a motor car plays a part impelled us and we crowded in to get our information at first hand. This is what we found: A fine big car whose bonnet, mudguards and front glass were covered with a yellowish red stain, whose radiation cap was torn off at one side and very badly bent, a chauffeur more scared than hurt and thoroughly disgusted. A glance told the whole story. An

accumulation of rust and sediment had clogged the overflow pipe, a pressure of steam had been generated in the cooling system as the motor was kept running when the car stood still and something had to "give." The cap was the "point of least resistance" and off it went and a geyser of hot water and rust shot up into the air to shower the front of the car. Moral: Keep the vent pipe open.

Mysterious squeaks can often be traced to the springs or their bearing pins. The best way to trace them is to take hold of the dumb-irons and lift the car up and down. Although this sounds like a weight-lifting feat, it is nothing of the kind, because if you press and pull alternately on the dumb-irons, the car quickly responds without much effort, and by timing the actions and reactions plenty of motion can be imparted to the springs, whereupon any squeaks will at once make themselves apparent and be easily located.

However, there is a more subtle form of spring noise which has puzzled many. Usually this mystery will be found when the car is passing over rough or slightly rough roads, a great deal of rattle is noticed coming from the front. At first you suspect the cross-coupling rod of the steering, also the ball and socket joints of the push and pull steering rod, but play in these being so slight that it will be obvious the noise could not possibly proceed from these sources.

The idea then comes to quicken the action of the front axle when passing over rough ground. Of course, under these conditions, the axle is seldom, if ever, parallel with the car in front elevation. At one moment the left side is higher than the right and the next the right is higher than the left, and so on. Obviously, the easiest way to approximate to these conditions is to vary the "shake-up" test, that is instead of lifting the dumb-irons up and down simul-

Necessarily, the box is somewhat wider than the spring, and this clearance is much increased by wear, so that, unless washers are put between the spring and the box to prevent side play, it is fairly obvious that, as the axle plays unevenly up and down beneath the chassis, the spring will strike one side of the box or the other and so make a clattering noise, as it is quite free to slide laterally on its pin unless washers be fitted to prevent this motion. Makers are giving more attention to car suspension than ever before.

Rattling fenders very often can be cured, temporarily at least, by the simple expedient of placing tiny soft pine blocks between fender and brace and drawing the bolts up snugly.

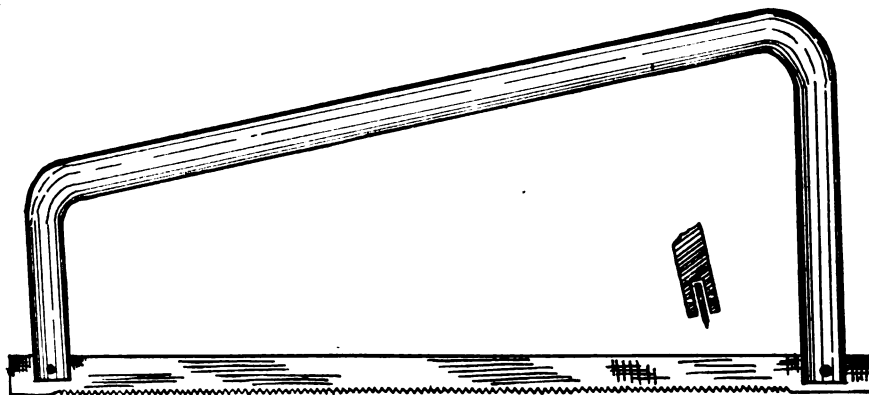
An annoying squeak in the body of the car can often be traced to the suspension points of the top. Where the top bows are anchored to the body there is usually considerable play. A little oil at these points will quite often eliminate the noise.

The resistance wires that serve to let on only a small part of the current until the gears are in mesh of the electric starter may be rendered more resistant to burning out by inserting inside the small coil a piece of porcelain similar to the upper part of a spark plug porcelain. This tends to abstract part of the heat and prevent overheating.

Repairing Leaky Piston Rings and a Twisted Transmission

T. E. WILSON

Here are a couple of cases of automobile trouble which the writer has just solved. The first one is not in-



THE FRAME IS OF SPRING STEEL WITH JUST ENOUGH PULL TO KEEP THE SAW STRAIGHT

taneously, to push and pull them alternately crosswise—that is to say, by endeavoring to rock the car sideways instead of vertically on its springs.

When you do this, the trouble will be solved in an instant. You will find that the annoying clatter is caused by side-play of the front ends of the springs upon their pins, so that the springs continually strike the lugs of the dumb-irons.

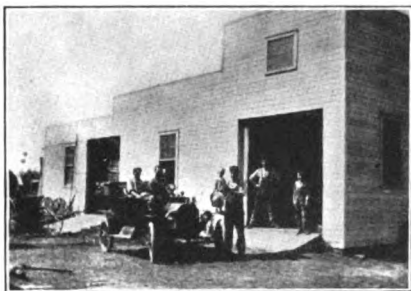
In case the cause of the noise has not been made clear, it may aid in doing this by pointing out that the front ends of the dumb-irons are usually stampings of a sort of hollow box form into which the front end of each spring passes, being held in position by a cross pin.

frequent, while the second is the first in my experience. Number 1 was a new car with a missing cylinder. After about five minutes' examination the trouble was located. We found there was no compression, but that the valves were not leaking. The parts being new, the piston rings were not yet working properly, and we proceeded as follows:

We removed the spark plug and poured about a pint of kerosene into



the cylinder. Then we ran the motor for about fifteen minutes; repeating this operation and replacing the plug each time. After about two hours' work of this kind, with motor running at a moderate speed, the rings took hold and the car left the shop with motor running perfectly. The person who brought this car in runs a small



MR. T. E. WILSON OF MISSOURI
DOES AUTOMOBILE REPAIRING

garage and is an automobile-school expert. He had sold the car and was on his way to deliver it when he noticed the difficulty and stopped to see if we could locate the trouble. He asserted that the car was not made right in the first place or it would not give trouble of this kind.

The second was a case of transmission trouble, and upon examination it was apparent that the driver had in some inexplicable manner twisted the mainshaft in the transmission case. The speed lever would go into the high and into the reverse only. We brought the car in on high, and endeavored to locate the difficulty. The transmission was so assembled that it was necessary to slip the gears off the end of shaft before removing them from the case. As the shaft was twisted it was impossible to do this without breaking something. Finally, we decided to saw the shaft in two in the case and remove it in pieces. You can readily imagine how much room there was for a hack saw frame in the gear case, so we undertook to make a special one for the occasion, like the accompanying engraving, and it worked fine. It was a long and tedious job to do that sawing act in such close quarters, but when this was accomplished, the shaft was easily removed and replaced with a new one. We might add that a bruised finger was the result of this job, for which we received \$10.55 as accident insurance to say nothing of the pay on the repair.

The picture is of our shop, and the writer is shown in picture holding the little boy standing on the fender of the car.

A Home-Made Oxygen Carbon Remover

J. NAVEMAN

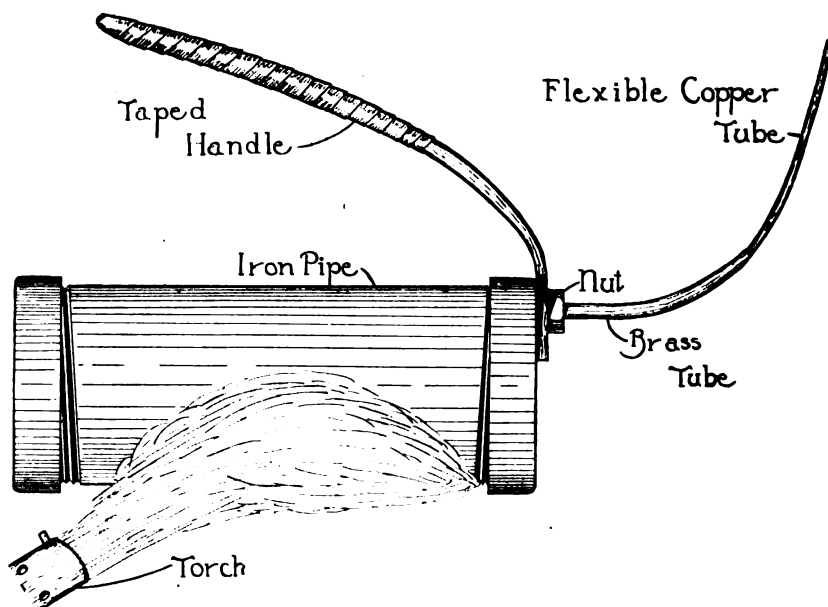
It was my painful task from time to time, as occasion demanded it, to remove the accumulation of carbon from the combustion chamber and piston of the stationary engine which I use for power purposes. Formerly, the work was accomplished by removing the cylinder head and scraping the interior, but after having witnessed the ease with which an automobile repairman cleansed the six cylinders of a car engine by the oxygen process, I went back to the shop and constructed the piece of apparatus shown by the accompanying illustration, which has proved very effective.

It comprises nothing more complicated than a short length of wrought-iron pipe, 1½ inches in diameter, threaded and capped at either end. Through one cap a hole was drilled and tapped, and a similarly threaded length of brass tubing screwed into the hole. A suitable

as shown by the sketch. This handle was taped to overcome the heat of the iron.

To use the device, a couple of ounces of chlorate of potash to which has been added a teaspoonful of manganese dioxide (the two being thoroughly incorporated) are introduced into the chamber formed by the pipe; the rear cap being removed for the purpose. The cap is screwed tightly in place again and the chamber is heated with a blow torch. As soon as the ingredients are heated sufficiently, oxygen is given off. The heat should be kept constant to insure a steady flow. Care should be taken not to apply too much heat. For cleaning multiple cylinder motors, greater quantities of chemicals can be added. Since the manganese dioxide acts merely to stimulate the decomposition of the potassium salt, it is evident that the proportions are not all-important. Both chemicals can be obtained at any chemist's in small quantities and at low cost. Care should be taken with the potassium chlorate not to let it come in contact with any foreign substance.

Before this generator is heated, however, the engine of the car should be run and then the gasoline supply turned off at the tank. The engine should be allowed to continue running



A HOME-MADE CARBON REMOVER WHICH USES OXYGEN

length of annealed copper tubing was soldered into the end of the brass pipe. A handle was provided, by fitting a piece of ¼-inch strap iron, drilled for the passage of the brass tubing and held in place with a nut

until the whole of the gasoline in the carburetor is exhausted. This precaution is necessary in order to avoid risk of fire. The valve-caps are then removed in order to gain access to the combustion chamber. The water



jacket is maintained full of water, as usual. The cylinders are taken in succession, each piston being brought to the top of the compression stroke. The adjacent coachwork and all other parts which may be damaged by the sparks should be protected by asbestos sheets or wet cloths. A fire extinguisher or box of sand should also be at hand in case of emergency. A piece of cotton waste made up into a hard ball and soaked in gasoline is ignited and dropped into the combustion chamber through the valve cap. Immediately the jet of oxygen is introduced, and under its influence the carbon deposit is caused to burn, sparks issue from the valve-caps, and the jet of gas is directed into all parts of the chamber until the whole of the combustible matter is completely consumed.

The operation is repeated with each cylinder; the piston being brought to the point of highest compression. The operation barely takes two minutes for each cylinder and, when complete, the car can be immediately used after replacing the valve-caps. It has been suggested that the

burning action deteriorates the interior of the cylinders; but, as a matter of fact, the temperature attained is lower than that reached under working conditions. Apart from the risks of fire and small explosions that may take place upon introducing the jet of oxygen there is no danger. The method seems to be based on sound principles, as every particle of the deposit is completely and expeditiously removed and at a small cost.

Air Compressor Made From an Engine

E. C. LUCAS

I recently made an air compressor from a two-cycle gas engine that works very satisfactorily. The first thing to do is to fill all the ports with babbitt, as shown in the illustration. Lengthen the connecting rod so the piston will travel almost to the top of the cylinder. Next, screw a ball check valve in where the spark plug was, and a ball intake valve where the priming cup was. This hole from the priming cup may not be

large enough to be tapped for a thread to receive the valve; in that case it should be soldered with an air tight joint. The check valve is connected with a pipe from an air

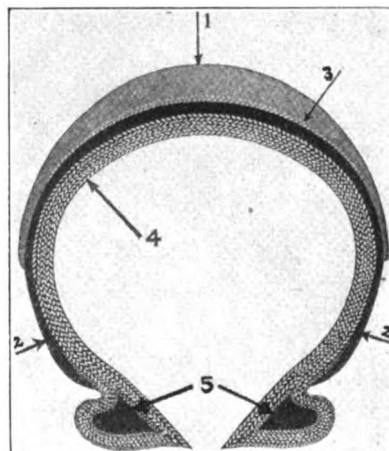
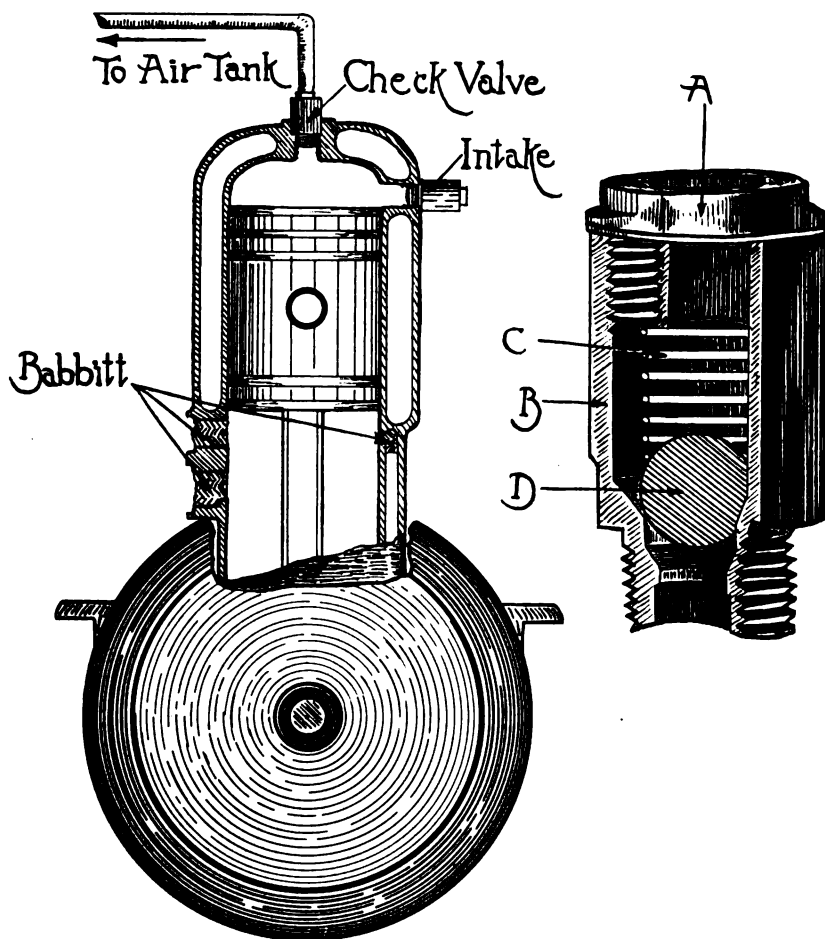


FIG. 1—ILLUSTRATING THE PARTS OF A TIRE CASING

tank. These valves I made from two spark plugs and two ball bearings. The top part, A, of the spark plug containing the porcelain was unscrewed from the bottom, B, and the porcelain knocked out. A ball bearing, D, was dropped in and a light spring, C, placed over it and then the new hollow bushing, A, screwed on again. This is the check valve. The intake valve is the same, with the exception that the spring is placed below the ball. If the engine is water-cooled, connect it up as for running. The flywheel can be used for a pulley or a regular pulley put on. For a 3½-inch bore and 4-inch stroke, I run the compressor at 400 R. P. M. Be sure to have all connections air-tight.



HOW ONE PRACTICAL READER MADE AN AIR COMPRESSOR FOR THE CONVENIENCE OF HIS AUTOMOBILE CUSTOMERS

Vulcanizing: the How, the Why and the Wherefore*

E. V. S.

The Tire

Before discussing the operation of vulcanizing it is well for us to understand the actual construction of the pneumatic tire. The first operation in building a tire is to lay several plies of friction duck on a solid core. Each layer is stretched and formed around the core until the total number of plies of canvas have been put

*We are indebted to the C. A. Shaler Company, Waupun, Wis., for the loan of the photographs used to illustrate this article.



on. After one half of the total number have been stretched to place, the hard composition strips forming the beads (shown at 5 in Fig. 1, Page 233) are set on, and the following layers go completely over this hard rubber bead. The "cushion" (shown

a more perfect adhesion between the tire body and the breaker strip, and the last named saves the body of the tire from bruises and cuts that might otherwise do serious damage.

The tread on wearing surface

Vulcanizing is a hardening process brought about by applying a high degree of heat to Para rubber that contains a certain amount of sulphur; without which the rubber will not harden. The curing of new tires is done in large iron kettles into which live steam at high temperature is introduced. The action of this steam is to melt the sulphur and reduce the rubber to a very soft, plastic condition; and a further prolongation of the heat brings about the tough, springy condition with which everyone is familiar. After vulcanizing, the tire is inspected, trimmed, painted on the inside surface and laid away to age for several weeks, and then it is ready for the market.

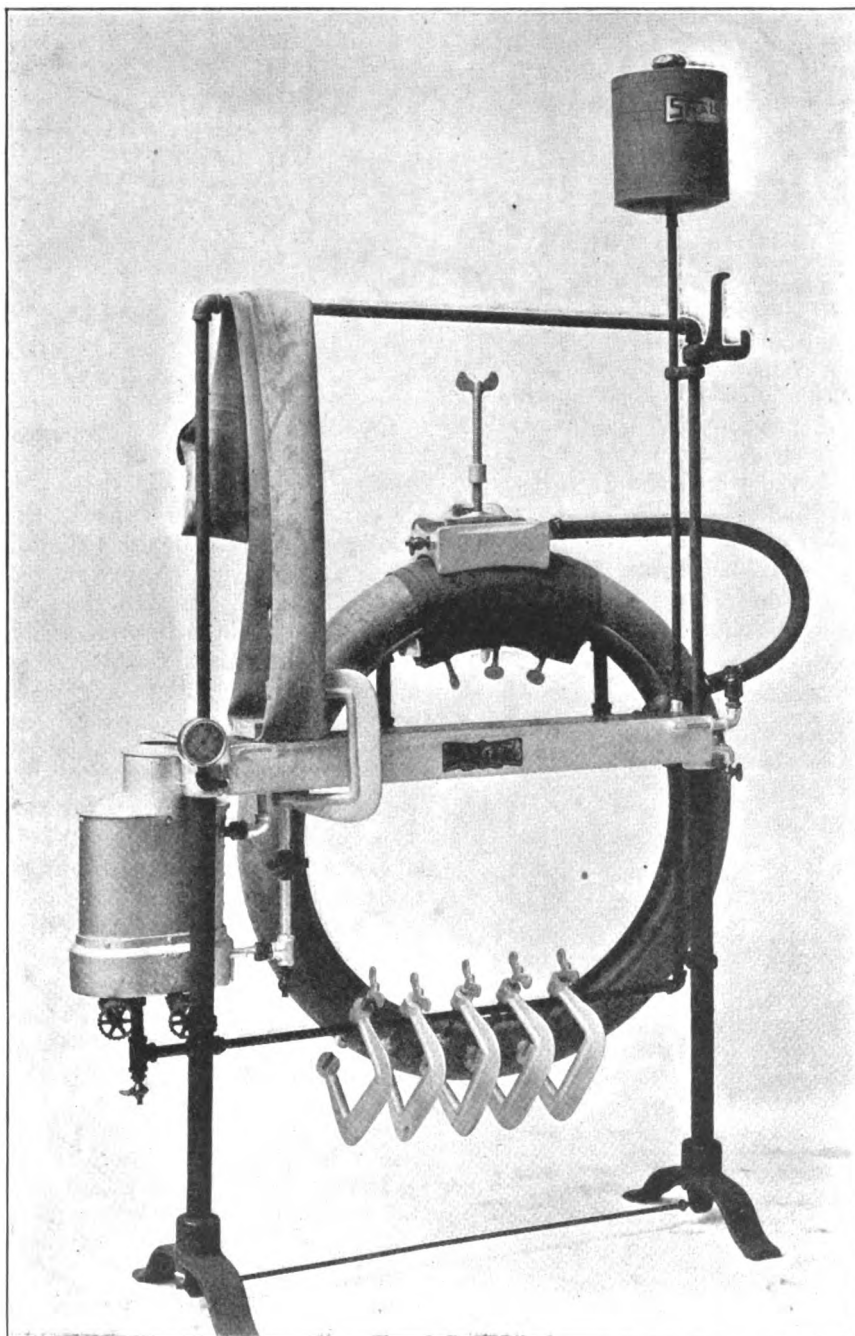
The inner tube is composed almost entirely of pure Para rubber; having only enough sulphur in the composition to insure the proper degree of curing.

Repairing Tires

In the repair of tires it is necessary to have a "vulcanizer" to secure the proper degree of heat for curing the rubber. There are any number of these on the market, each having their peculiar and individual method of operation. They are heated by a gasoline or alcohol flame and by steam or electricity. The source of heat is immaterial so far as the vulcanizing process is concerned. We will not discuss their operation here, as the makers furnish detailed instructions with each outfit. Fig. 2 illustrates a form of steam vulcanizer in use. These are the most compact and easiest to operate. The upper tank is filled with gasoline and the thick center partially filled with water. The burner is lighted and the vulcanizer takes care of itself; the pressure and temperature being automatically regulated by a thermostat. This vulcanizer, it will be noted, can be used both for tube and casing work.

The first requisite in vulcanizing is absolute cleanliness. No matter how good a vulcanizer you have, or what kind of repair stock you use, the smallest amount of oil, grease or dirt will greatly impair the work. The tires must be dry before beginning work on them; otherwise a porous patch will result. Only the best grade of materials should be used in turning out the work.

(To be continued)



Courtesy of Shaler Co.

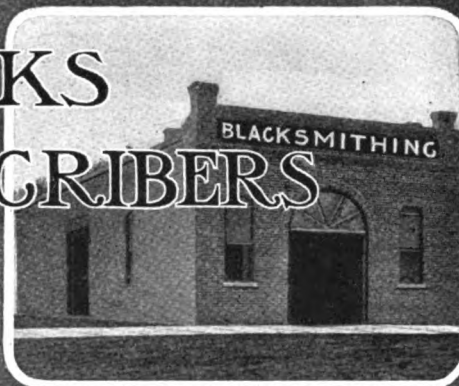
FIG. 2—A STEAM VULCANIZER FOR WORK ON BOTH TUBES AND CASINGS

at 2 in the illustration), which extends from bead to bead and made of pure rubber, comes next, and on this the "breaker strip" (3 in the engraving), a loose-woven piece of friction duck which protects the body of the tire. The cushion makes

comes last, and as this receives all the road wear, therefore it is made quite thick and of compounded rubber that wears better than a pure rubber gum. After the building operation is completed, the tire is "vulcanized" or cured.



TIMELY TALKS WITH OUR SUBSCRIBERS



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"I do not want to miss one number. You cannot be up to the minute, alone, no matter who you are. With the co-operation of so many helpful friends through 'Our Journal' we are kept in touch in every respect."

Mr. Jack Petjanos of Oregon:

"I wouldn't like to have THE AMERICAN BLACKSMITH stopped, as I think it is the biggest part of the business."

Mr. G. E. Settle of Kentucky:

"I have been in the blacksmith business since 1874, and I cannot understand how any smith can get along without THE AMERICAN BLACKSMITH."

And then read this letter from a new subscriber—he only recently made the acquaintance of "Our Journal." It is interesting to read what he thinks of the paper. This letter is from Mr. E. Tarter of Kentucky:

"I received the copy in due time and read it carefully. I found a great deal of information therein, and certainly appreciate THE AMERICAN BLACKSMITH. I find the advertisements most valuable to me; they help me make my shop up to date. With the information I receive from the paper, I can make my work easier. THE AMERICAN BLACKSMITH is invaluable to me."

Could more be said of any paper? Tell your neighbor—tell him about the paper and what it has done. Tell him about the picture—the reproduction of a famous painting. Tell him how he can get it. AND THEN tell us to enter his order. Will you do it today?

Subscription Agents

When a stranger solicits your subscription to THE AMERICAN BLACKSMITH, or any other publication, insist upon his showing you absolute proof that he is an agent in good standing and is employed by the publication which he represents. Don't, under any circumstances, give the man your money if you are not sure that he really works for the paper he says he does. No matter what the man offers you—no matter what price he makes—no matter what premium he promises to send—DON'T GIVE HIM YOUR MONEY IF YOU ARE NOT SURE.

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On Electroplating

With this issue begins a series of articles on electroplating. This series will cover the subject completely; beginning with the necessary notes, references and explanations, to electricity and how it is used in electroplating. Each operation connected with plating is gone into and all the various equipment, tools and appliances explained.

In following these articles on electroplating, questions will no doubt occur to you on some of the matters. Send these questions in for solution. When you actually try your hand at plating work, more questions—actual puzzles—will come up. Ask us to solve them for you. We want to make these articles the same as all other articles; just as valuable, as practical and as useful as possible. So ask questions whenever you are puzzled.

Protection Against the Price-Cutter

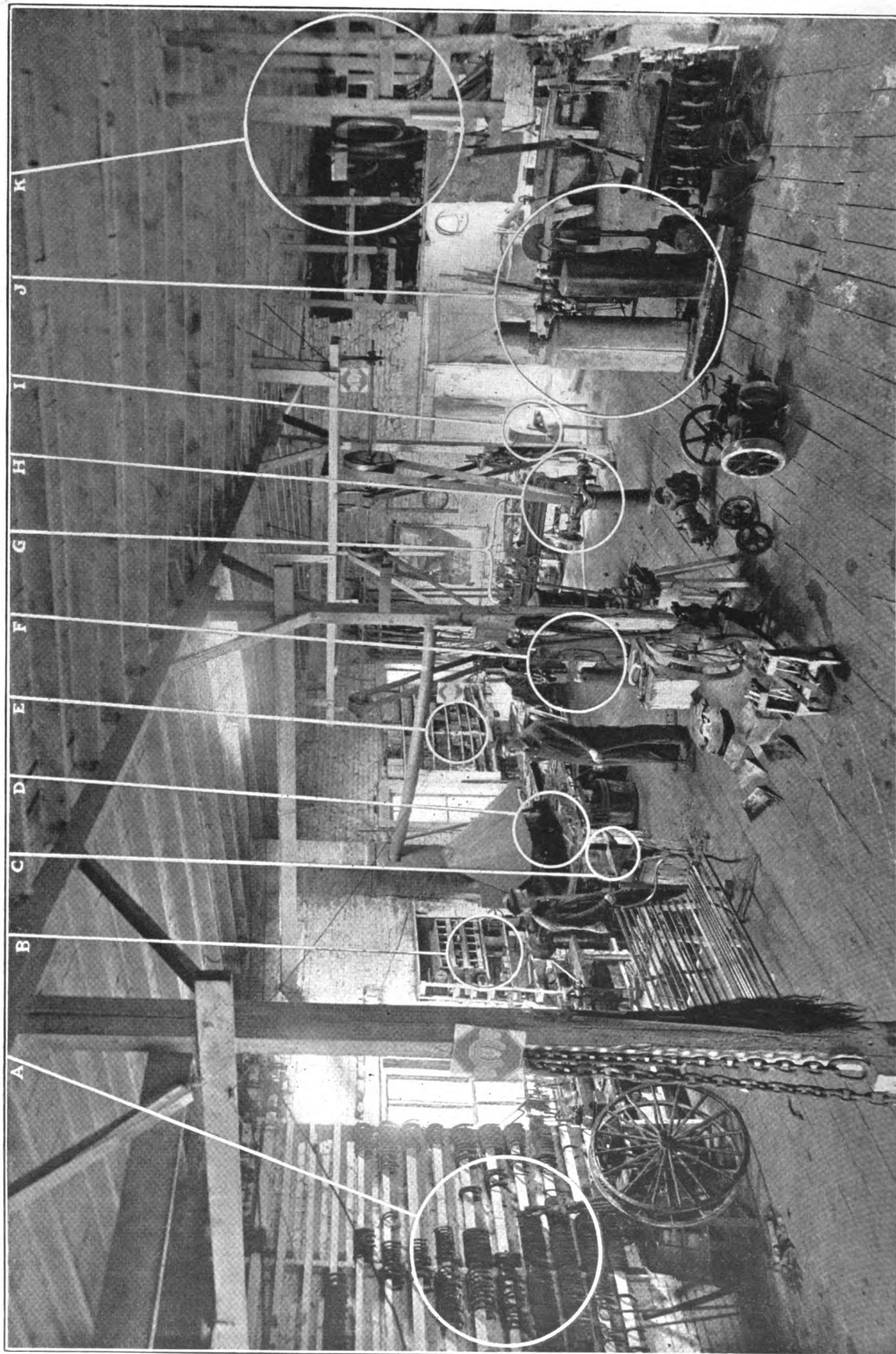
What shop-owing smith is not interested in that subject? What real live smith would not be glad of a solution to the price-cutter problem? Read Mr. Buckley's article in this issue: "An Association's Protection Against the Price-Cutter." He tells how to hit back at the price-cutter; how the price-cutter can be fought on his own ground. If you have ever had any price-cutting troubles, read Mr. Buckley's article and apply the ideas he gives you to your own problem.

The Blacksmith

By the time this paper reaches you, we will have completed the printing of a big edition of "The Blacksmith"—the original painting of which was purchased by THE AMERICAN BLACKSMITH, and is now hanging in our office.

We want every subscriber, every blacksmith, every worker at forge and bench to get a copy of this fine painting. Arrangements have been made to distribute these pictures among "Our Folks" first; and announcement is made in this issue of how you can secure one of these excellent reproductions of a great painting.

This picture is worthy of framing and hanging in any home. If you have a neat office, you will in all probability want to have one framed for your office also. But wherever you desire to hang a picture, be certain that this one will prove suitable. The original painting is owned and copyrighted by THE AMERICAN BLACKSMITH, and copies of it can be secured from no other source and in no other way, except as announced elsewhere in this issue.



THE GENERAL SHOP OF MR. J. J. UTZ OF ILLINOIS—A WELL EQUIPPED AND CONVENIENTLY ARRANGED INTERIOR WITH PLENTY OF LIGHT—
—SEE PAGE 235 FOR DESCRIPTION



Smith-Shops and Smith-Shacks

BY THORNTON

THERE are shops and shops—and there are about fifty-seven kinds of each of the fifty-seven varieties. Some shops look like a dollar just out of the mint—bright, clean and untarnished; while others look like a New Year's resolution in March—worn, withered and pretty much frayed on the edges. It is this latter kind that I am going to rip into and the former variety that I am going to boost.

In my estimation, there is no excuse for a smith being in any old shack of a shop for very long; and the sooner some smiths get that idea well settled in their minds the sooner will the general public change their ideas regarding the craft, the business and the men in it.

The accompanying engravings show some of the worst examples of smith-shops that I have come across. They are located in various sections, as shown by the titles, so no one section of the country seems to have a monopoly on this variety of shop. In fact, this variety of smith-shop seems to be common to all countries; and I wager that some of our good brothers in England, Australia and in South Africa can point out some pretty bad examples of "near-smithies" in their own lands.

Of course, there may be an excuse for a smith being in a poorly-built

shop, temporarily; but as a permanent work place, a shack is no place for a real smith; and, perhaps, the least said about the poorly built smith-shack the better—according to some minds. I, however, think that an occasional talk about things that are not as they should be and an occasional limelight demonstration of their shortcomings and faults will do a heap of good.

It is sometimes better to plant a well-directed pedal extremity on a man, than to hand him a jolly slap on the back—I mean sometimes better for the man; and so I think it well to contrast some of the poor shops and some of the better shops, and show just exactly what both varieties look like when you look at them in the right way.

Smith-shops, such as shown in the engravings, to illustrate the kind of shop *not* to run, remind me of the smith of whom I asked: "Why don't you build a new place where you can have room and some comfort and keep things dry?" In reply, he voiced the excuse that so many give: "Oh, it's good enough; it's only a blacksmith shop."

But—"good enough" is seldom "good"; though it is usually "enough"—even for a smith-shop.

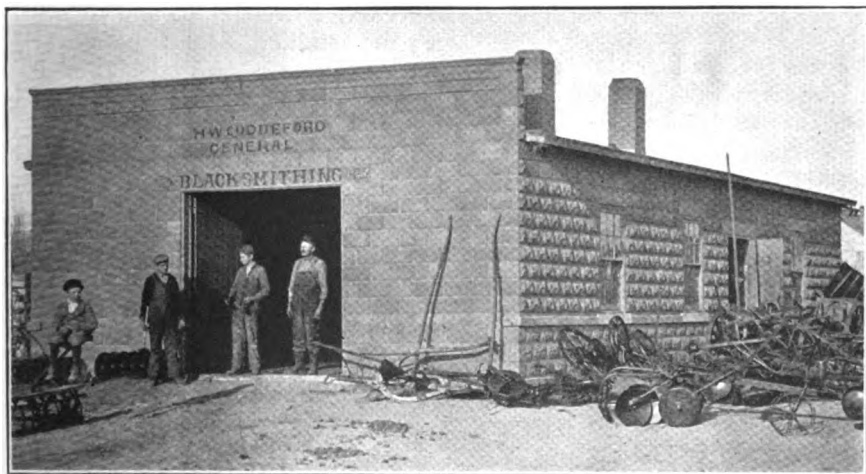
I went into a shop a while ago, that looked as though it had been

constructed from the left-overs after a tornado's visit. Inside the shop there was about as much appearance of life as at an undertaker's establishment. The smith was comfortably



A WELL-BUILT SHOP OF HOLLOW TILE CONSTRUCTION

wedged into the arms of a big chair with his feet on a shoe keg. Here he sat dreaming of sawmills—at least it sounded like it—entirely oblivious of my visit. Seeing him so busily occupied, I did not disturb him, but simply looked about to find how the place was equipped. The equipment and general condition of the place was so thoroughly in keeping with the attitude in which I found the smith that a most thorough understanding must have existed between shop and smith—an understanding that is equaled only by that of two young people who have learned the same kind of a tango. There were half finished jobs lying about everywhere. The engine—oh, yes, he had an engine—was so covered with dust and dirt that it was impossible to tell whether its cylinder and wheels had been painted red or black, originally. I looked to the shafting, and found that it was partly down and partly up—I didn't know which—so I concluded that the smith must be "house-cleaning," and that would account, too, for his tired feeling for which he was seeking relief in the arms of Morpheus. This will, however, always remain a question, as I could wander about no longer; there being, for me, about as much pleasure and comfort in looking around such a shop as there is in listening to a man



THE CONCRETE SHOP OF MR. H. W. CUDDEFORD OF NEBRASKA WHERE GENERAL WORK IS DONE



with an indifferent musical ear trying to play a cornet.

I often wonder how men can work in the shops I have seen. Happily, these smith-shacks are getting fewer every year, and we are seeing good shops of brick and cement take the place of them. I hope that the day is not far distant when every smith-shop in the country will be a building built especially for smith-shop use. There has been all too much of the any-old-place-will-do attitude with reference to smith-shops.

It would seem that little more could be desired, these days, in the way of labor-saving equipment for the smithy. With the electrically-equipped forges, electrically-driven drills, with power hammers and emery wheels, with power punches and power shears, and with practically any and all combinations in wood-working machinery, the smith and vehicle man is certainly relieved of a very considerable amount of hard labor; and it certainly is up to the smith to do all the work he possibly can by means of machinery. Large manufacturers know that machines are cheaper than men and, consequently, you find the large plants changing equipment almost continually, because some new machine has been invented which will do twice or thrice (sometimes more) the work of former devices. In consequence, manufacturing costs are greatly lowered, output greatly increased, and profits—well that brings us into business and accounting, and this is supposed to be a talk on smith-shop equipment.

But, a little more of this spirit can be displayed in smithing circles without doing any harm.

So let us all vote for more rain-proof smith-shops and fewer shops of

the kind that seem intended for outdoor sleeping quarters. "Actions speak louder than words" and, in this particular instance, a good smith-shop building, neat appearing and well made, will do more to encourage respect and to impress people generally with the real importance of our craft and business than most anything else.

The Frontispiece

The frontispiece this month shows an interior view of the shop of Mr. J. J. Utz of Illinois. It illustrates how well a shop can be equipped, and how well the equipment can be arranged so as to enable the men to work freely and yet to have no great distances to



A SHOP THAT GRACED AN OHIO ROAD SIDE

go from one machine to another or from stock rack to machine.

For example, in the frontispiece, the horseshoe rack at A is within a reasonable distance of the forge and right at hand on the shoeing floor. At B is shown a tier of shelves for small parts. This, it will be noted, is right over the workbench where most of the contents of the shelves are used. At C and D are the anvil and forge. At E is another tier of shelves and boxes for small parts, and also located over a workbench. At F is shown the power hammer within a few steps of the forge fire. At G we see the lathe—at the back of the shop with plenty of light on all sides. The emery stand at H and the grindstone at I are well placed. Then comes the oxy-acetylene plant at J. This is a portable plant; being mounted on a wheeled platform to allow for use in any part of the shop. At K are the stock racks.

This shop is well kept and well arranged and should enable the men to turn out a very considerable amount of work quickly and well.



A PENNSYLVANIA SHOP THAT LOOKED MUCH THE WORSE FOR WEAR

Mr. Utz is the smith, an example of whose oxy-acetylene work was shown on pages 226 and 227 of the June issue.

How a South Dakota Smith Built Up a Business

HENRY DYRSSEN

I started in business in 1909 on a small scale. I rented a small building which measured about 20 by 24 feet. I had about \$250 to start with, which I was obliged to use for the purchase of stock and tools. For the first couple of months I scarcely made expenses, but when the people learned that I turned out good work, I got all the work I could do; in fact, I was obliged to work twelve and fourteen hours a day at times.

In 1912 I built an addition to the old shop, 30 by 36, and in 1913 extended the shop still farther; which made it 30 by 60 feet. It is on a good solid foundation; I have all up-to-date tools and machinery, and a large stock of iron and wood on hand all the time.

We have good farmers in this vicinity and receive fair prices for our work. Here are some of the prices: Horseshoeing, common shoes, 50 cents; Neverslip, 65 and 75 cents a pair; stallion, \$1.00; plow-work, 1 lay, 40 cents; two lays, 75 cents; buggy pole, \$3.00; circle for pole, \$1.25; crossbar in shaft, \$1.00; new side in shaft, \$1.50; wagon pole, \$3.00; bent hounds, \$3.75; new bolster, \$2.50; bolster complete, \$3.50; cutting down wagon for medium size, \$18.00; new spoke, 25 cents; one half new rim, \$1.50; full rim, \$2.25.

A Collection of Handy Shop Kinks

O. E. S.

Here are a number of handy shop kinks, short methods and practical



A COMBINATION OF HOME CARPENTRY AND PAINTING IN A MISSOURI TOWN



THE NEAT HOME OF MR. W. B. KIRKER

hints that are of daily aid to the practical smith. The few helps seem to be especially appropriate for the Shop Number.

To DRILL a piece of hardened steel, try a well-tempered flat drill and use camphor and turpentine as a lubricant.

To FASTEN A WOOD SCREW, that persists in coming loose, try the following: Remove the screw, and plug the old hole with cork; then replace the screw and it will hold firmly.

To CASEHARDEN CALKS, heat a piece of plowshare in the fire. When the metal becomes soft and begins to melt, rub the calks with it. It will rub off easily, stick to the calks and make them hard-wearing.

To SHARPEN DRILLS correctly, take a hickory block about two by three inches in section and of a convenient length. Bore several holes in it at an angle of 15°, to fit the various drills to be sharpened. Then place the drill in its proper hole and grind both ways toward the center. By twisting the drill a trifle to the right of the center you can give it plenty of dip.

To TEMPER PUNCHES, cold chisels, flat drills and tools similar in form, use the following solution: Dissolve 1 ounce of bi-chloride of mercury and 2 pints of common salt in 1½ gallons of clean rainwater. Mix thoroughly and then use as usual; dipping the tools and drawing.

WHEN BABBITTING BOXES, try placing a piece of resin about the size of a walnut in the metal; stirring it thoroughly and then skimming.

To MAKE A BELT GRIP on the pulleys, try an application of common soap in an emergency. It will enable you to do a job of grinding or drilling some time when the belts seem to persist in slipping and sliding.

To BABBITT LARGE BOXES, it is well to heat the box quite warm before pouring the metal. This will prevent the metal stalling before the box is poured. The heating also dries out any moisture likely to be in the box and which would cause trouble when the hot metal came into contact with it.

AN EASY METHOD OF CLEANING the hands, is to dip them first into kerosene, and rub what dirt and grease will come off without adding anything more. Then, make a mixture of some good soap powder, white sand and fine sawdust, equal parts, and rub thoroughly; using just enough water to make a thin paste of the compound when spread on the hands. A thorough rinsing will then make them clean.

To ATTACH THE RUBBER BANDS to band saw wheels, make a cement as follows: Take one part powdered shellac and ten parts ammonia water and place in a tight jar for about a month. This can be used for attaching soft rubber to iron and will make a tight union.



THE SHOP OF MR. W. B. KIRKER OF OHIO

IN WELDING STEEL SPRINGS AND AXLES, a combination of borax and steel chips is excellent. After scarfing, place some borax on the scarf and, when this is melted, sprinkle a few steel chips on the scarf; then a little more borax. When the chips begin to stick, turn pieces and bring up fire until parts are right. When ready to weld, bring to anvil, but do not knock off scale.

To TIGHTEN THE BRISTLES of a brush, especially those used in painting and varnishing, treat the brush as follows: Hold it in the vise—bristles up. Then separate the bristles and pour a small quantity of shellac into the roots. This will saturate the base of the bristles and, when hard, will hold them firmly.

WHEN TAPPING DEEP HOLES in tough steel, grind away the tops of



THE PRESENT SHOP OF MR. DYRSSEN IS WELL EQUIPPED WITH MACHINES



the threads of the taper tap the whole length of the tap, leaving only half the thread, and giving a slight clearance. This reduces the work it has to do, and prevents breakage. Follow with second and plug taps in the usual way.

Why I Wet Coal on the Forge

L. R. SWARTZ

There is some difference of opinion as to whether one should "wet down" coal for the forge or not. While I am not as fine a smith as many following the craft, still I have a theory on wetting coal and, in consequence, invariably wet the coal I use. I have found, however, that the benefit of wetting is more apparent when poor coal is used, and it is not a necessity when real good coal is at hand.

Water is composed of hydrogen and oxygen. Two atoms hydrogen to one of oxygen. The heat of the fire changes the water to a gaseous state, which is steam. The oxygen of the water combines with the heated fuel; thus supporting combustion; the hydrogen combines with sulphur, and

uents—hydrogen and oxygen—which are invisible. It is the hydrogen which makes a slight explosion when the blast is turned on a smothered fire in the forge. Hydrogen burns with an intense heat, but makes very little flame. It would be easy to demonstrate this matter by laboratory tests; and if I had the equipment I would undertake it.

Another reason that leads me to believe that wetting coal is good practice, comes from my experience in firing boilers. One can always get better results in firing with wet coal than with dry coal. This is especially noticeable in firing small boilers such as are used on traction engines and drilling rigs.

Who has tried underfeeding when working with a hollow or bake-oven fire? Some time in the future I will tell my experience in that line.

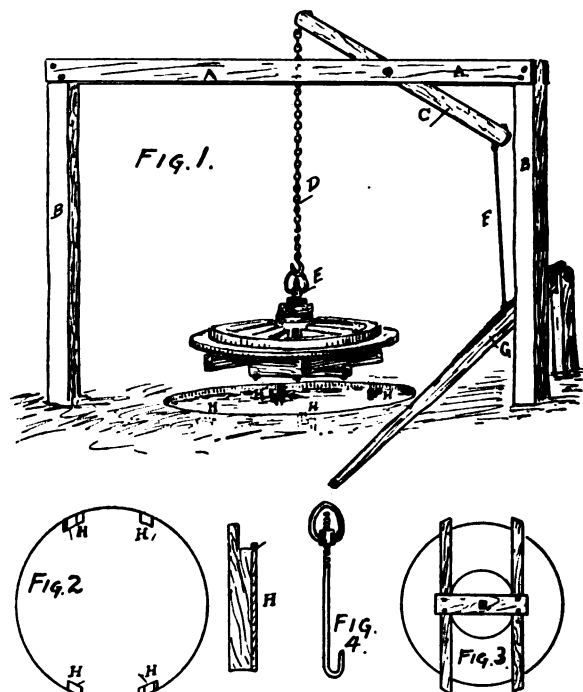
A Sinking Tire Platform

A New Zealander suggests the device pictured in the accompanying engraving in an Australian exchange.

Fig. 1 shows a general view, with the platform raised clear of the water, in order that the idea may be more easily explained. In actual use it need be raised only an inch or two above the posts. This requires little explanation, the two top beams A being checked into the posts B, B, leaving a space for the overhead lever to work through. The lever has a chain D on the short end, which hooks on the nut E (Fig. 4) after the tire is on.

On the long end a rod connects it to another lever running at right angles to it. Fig. 2 is the tank, and should be 8 in. wider than the platform; depth according to requirements. On the inside must be fastened four or more posts H, H, H, H, of a length so that the platform comes about level, while tiring. On two of the posts should be projections of iron or wood, reaching to top of tank, to form a guide to bring platform

back to its place after lowering; and a shorter piece, say 1 in. longer than post, to keep platform in place. The whole of Fig. 2 will require binding on the outside on its upper edge.



AN EASILY MADE SINKING TIRE PLATFORM

Pieces of old tires do very well. Bolts or rivets go through tank and posts and plates.

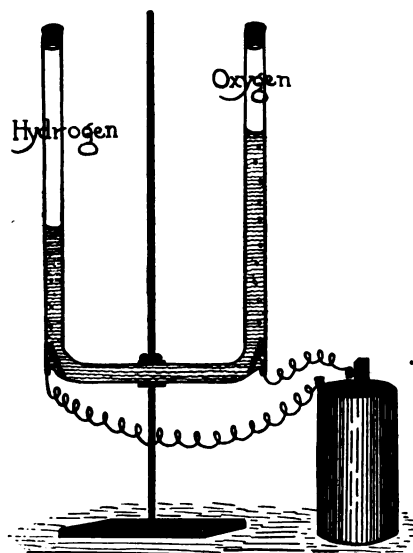
Fig. 3 shows the platform lying on a frame. The frame has the ends 3 in. over platform, and the center crosspiece must be packed down to give room for the hub of the wheel. This crosspiece can be taken right across and made to rest on two additional posts in tank (of course, on a lower plane) if desirable. Fig. 4 shows hook and nut for holding down wheel.

The tire is put on, the chain then hooked to the nut, one man or boy lifts the ground lever, another pushes the wheel round off the posts, down it goes, then up, pull or push it till it strikes the guides, then down on posts once more, and there you are.

Wiring the Shop for Electric Light and Power

Electrician

The practical installation of an electric lighting and power system in the shop is easy for the handy man with tools. All work, however, must be of a certain high standard, and meet stated specifications that are



WHEN AN ELECTRIC CURRENT IS PASSED THROUGH WATER

goes off in the form of the gas—sulphuretted hydrogen. Steam is only a gas; and it remains invisible until cooling condenses it; when it is the "steam" we observe with the eye. When an electric current is passed through water in a suitable vessel (as seen in the engraving), the water is decomposed into its two consti-



fixed the country over by the National Board of Fire Underwriters. Before the company furnishing the power can connect its line to an electric installation, it must first have been passed by the local representative of this official board. In consequence of such, there are certain common-sense, rigid rules that must be carried out in doing the work.

The first thing to be considered is, of course, the actual layout, that is, the number of lights, their position, the motors and any other miscellaneous equipment that may be installed. We cannot do more, on this account, than to take a model shop, show its arrangement, and give the needed information necessary for the actual work. Fig. 1 gives the floor plan of a well-arranged, medium-sized shop. The electrical equipment consists of eight incandescent lights, one electric blower and a motor. The positions of the lights are indicated by the cross and circle; the blower and motor as shown.

The first thing to be decided upon in every case of first installation of electricity is the place of the entrance of the current in the building. In this instance, the office was considered as the most suitable place, as the apparatus was then away from the hands of meddlers and yet was

favorably accessible to the outside.

Fig. 2 shows the entrance of the line into the building. The petticoat insulator and bracket are generally furnished by the power company, and provision should be made for their placing. From there, the wire is carried to the elbow coupling, B, and down the iron conduit. This conduit is a special pipe made for the explicit purpose of electric wiring. It is $\frac{1}{2}$ inch in diameter, and is readily fastened to joists, beams, framing, etc., by means of the clips on C. Iron conduit is not the cheapest form of wiring, but we have selected it because it meets the individual needs of the blacksmith shop so well. Advantages: It is water-tight, can be used regardless of dust, grit, fumes and dampness (the pipe is enamel-coated), it readily withstands all kinds of hard usage, jars, shocks, etc., in fact, it practically protects the wire from any injury whatever, and will last a lifetime. Its disadvantages are two-fold: It is more expensive than the common open method of wiring and takes more time to install. But, weighing the evidence, we have no hesitation in buying something good. "Cheap in the beginning, dear in the end," is not a motto to follow.

The conduit continues through

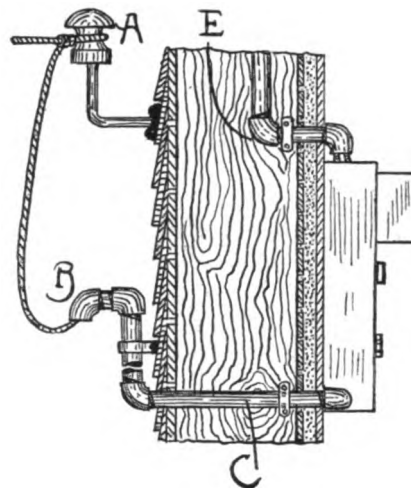


FIG. 2—HOW THE WIRES ENTER THE BUILDING

the wall to office which is finished off in lath and plaster and, consequently, a minimum of tearing down wants to be done. The panel-board, which is composed of several boards fitted together, is fastened securely to the studding; the conduit entering through it, as shown in the sectional view, Fig. 2, and in the front view, Fig. 3 (next page). Upon this panel-board is placed the meter with its self-contained switch, S, and the fuse-blocks, B. If there is no switch in the meter the company offers, one is placed between the fuse-blocks, B, and the meter terminal, T.

Before putting up the fuse-blocks, it is necessary to know how many. Each fuse-block is the outlet for one circuit. A circuit is considered as carrying 12 amperes and 110 volts. That is, the National Board of Fire Underwriters allows for the smallest wire in house-wiring (No. 14 B & S gauge) to have a maximum carrying of 12 amperes. This is a copper, rubber-covered wire. An incandescent lamp of 16 candlepower consumes $\frac{1}{2}$ ampere. On one circuit, then, we will have the eight lamps and the blower. The lamps together use only 4 amperes and the blower about 1 ampere at the most. This leaves a margin of 7 amperes for additions and overload on this circuit. For the motor circuit, we must first know how many amperes it consumes. A 3 H.P. motor takes, at 110 volts, 25.4 amperes. It will readily be seen that this current cannot be carried on the No. 14 wire. The proper gauge wire for this current is No. 8 B & S, which is capable of carrying 33 amperes; thus giving us a margin of 8 amperes for overload. The fuses on this circuit

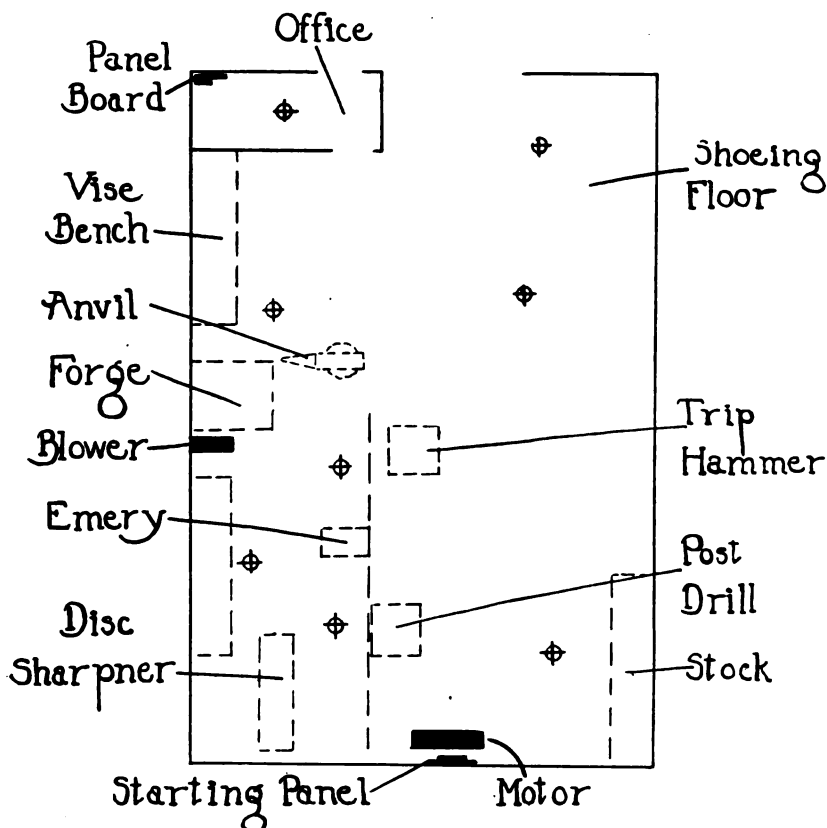


FIG. 1—FLOOR PLAN OF SHOP WITH LIGHTS AND MOTOR INDICATED

(the left-hand fuse-block in the engraving) must be of a size suitable to the current. The mica-front, 10-ampere fuse is used for the light circuit, but an enclosed heavy duty fuse is used on the motor line, and a large sized fuse-block.

After determining the proper number and size of the circuits, the next thing is the actual wiring. This shop has the ordinary ridge roof, and above the office was laid a rough floor for the purpose of storing little-used and bulky objects. This flooring was removed at the front end, so as to get at the space between the front wall. A hole large enough to admit the conduit was bored through the plaster and lath directly above the panel-board, as shown in Fig. 2. The conduit containing two strands of No. 8 B & S gauge wire was let down between the walls, until the short elbow, E (Fig. 2), came opposite the hole, was then pulled through and the elbow coupling screwed on. Upon each wire was slipped a piece of tough, fibrous insulator known as "loom" (L in Fig. 3), and the connection made on the upper terminal of the fuse-block. The top of the conduit was fastened as shown in Fig. 4; the wire being continuous

porcelain insulating tube, P (Fig. 4), through which the wire was drawn. The wire was fastened securely to the joist by the porcelain knob, K.

the ceiling. The wires, carrying the looms, were shoved through and the free ends connected to the "rosette," as the outlet receptacle is called. The

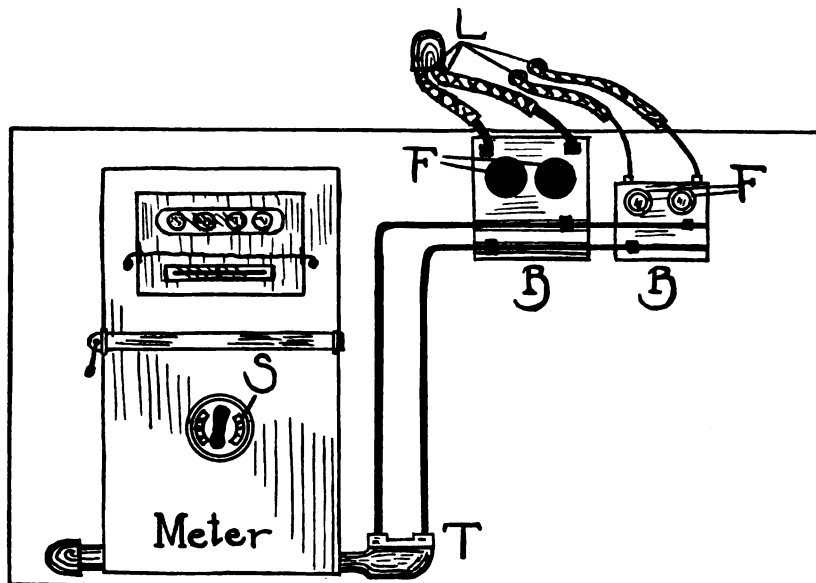


FIG. 3—SHOWING THE METER AND METER BOARD ARRANGEMENT

(These materials are, of course, purchasable at the hardware store or should be ordered direct from a supply house in quantity, after consulting their catalog.) The wire continued through the remaining joists

slack was pulled back; carrying the rosette which is fastened to the board, through the ceiling, by two long, slender wood screws. The two wires were cut to proper length and spliced off the light circuit as shown at R, Fig. 4.

In making electrical connections, that is, connecting one wire with another or in splicing, these rules must be rigidly followed: all joints must be soldered carefully, so there is no danger of the wire pulling apart. This joint, when cool, must be taped with electric rubber tape, and over this a final strong coating of adhesive tire tape is wrapped.

Fig. 5 shows how the conduits are laid out in the shop. The J's indicate the junction boxes and the E's show the end pieces, which are shown in detail in Fig. 5. The iron conduit is fastened to the under side of the beams by means of the clips and held in the junction boxes by means of the two nuts as shown. The lamp cord is held in the cover plate, C, by knotting. This cover is screwed to the box through the special extensions, X. The sections of conduit are joined together by a coupling as in ordinary piping. Keep in mind that all joints in the wire should be soldered and double-taped.

The pipe, M in Fig. 5, is the conduit for the motor circuit. This is run directly back and over to the

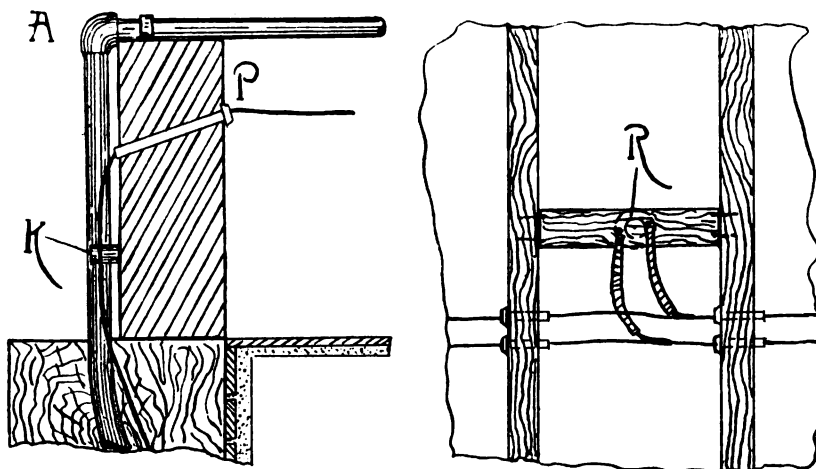


FIG. 4—SHOWING HOW WIRES ARE INSULATED THROUGH STRUCTURAL TIMBERS

and pulled through each section of conduit before it was threaded on.

For the lighting circuit, two holes, large enough to accommodate the "looms," were bored as shown in the engraving. Fig. 3. The wire, bent almost double at the end was pushed through and, by means of an improvised hook, was pulled up between the walls. Here, in the joist, a hole was bored diagonally to take the

in the same "zig-zag" manner until the end of the office was reached.

A ceiling light was to be put in the office; so the first thing was to judge its position in relation to the joists—it should never be placed on one. A small hole was carefully bored through and, directly above it, a stout, narrow board was forced between the joists and nailed securely. Two holes were put through this board and through

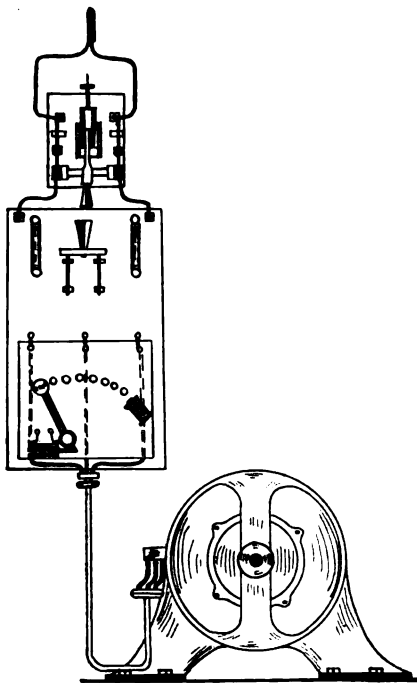


FIG. 6—THE MOTOR AND STARTING PANEL

starting panel, S. The complete starting panel is illustrated in Fig. 6. The automatic starting panel, consisting of the knife-switch the two link fuses, and the automatic release and rheostat, may be substituted by an ordinary fuse-block of sufficient capacity, a knife-switch and a rheostat; the connections remaining as shown. The circuit-breaker (at top) is necessary under all circumstances. The panel itself is made of hardwood and finished off appropriately. It is fastened to the wall; two cleats being placed between the wall and the board.

The connections, as shown, apply only to a direct current, shunt-

wound motor. The shunt-wound motor is the best for shop use. The directions for using are always given by the manufacturer with every motor. Motors should be installed in dry locations, and not in dirty or dusty places or near inflammable gases.

Gauge No. B. & S.	Diameter Mils.	No. Amperes Open Work	No. Amperes Concealed Work	Lbs. per 1000 ft. Bare	Lbs. per 1000 ft. Insulated
14	64	16	12	12	38
13	72	19	14	15	43
12	81	23	17	19	48
11	91	27	21	24	64
10	102	32	25	31	80
9	114	39	29	39	97
8	128	46	33	49	116
7	144	56	39	63	118
6	162	65	45	79	166
5	182	77	53	100	196
4	204	92	63	126	228
3	229	110	75	159	265

A Mil. equals 1-1000 inch.

TABLE SHOWING WIRE SIZES AND ALLOWED CAPACITIES

If location in a dusty place is unavoidable, the motor should be housed in a dustproof sheathing, or an enclosed type of motor should be used. Enclosed motors, owing to the temperature rise, due to lack of ventilation, have a lower rating, size for size, than regular motors.

A table showing the various wire sizes, and its allowed carrying capacity of amperes for open and concealed work, is given. The size of the wire increases as the gauge number decreases, and runs as high as

0000. We have included only the sizes that are necessary in the wiring of average shops.



The Horseshoer

"The Horse Still King", says *Our Dumb Animals*

A recent issue of *Our Dumb Animals*, a publication devoted to the cause of the prevention of cruelty to animals, contained the following interesting item on the horse and the motor truck. It seems to throw much light upon a subject that is being earnestly discussed by horsemen in all sections of the country and, in fact, the world.

The *Rider and Driver* published in its issue for March 14, twenty-eight replies from team owners of Philadelphia as to their experience with auto trucks compared with horses. These replies appeared in one of the Philadelphia papers. We select fourteen of them, though all were to the same effect:

Kolb Baking Company: "Work 400 horses, six autos; no trouble at all with the horses, and you can't make that assertion too strong; all sorts of trouble with the autos; bought more horses today."

Freihofer Baking Company: "Two hundred and eighty-four horses, twenty autos; every horse working except three; most of the autos out of repair."

Gimbel Bros.: "Two hundred and seventy-six horses at work, eleven automobiles; haven't had an unsuccessful trip with the horses during the storm, nor a successful one with the autos."

United States Express Company: "Two hundred and fifty-nine horses; no trucks, and best of all, not going to have any; have profited by the experience others are having with their trucks."

N. Snellenburg & Co.: "One hundred and twenty-eight horses at work, fifteen trucks. All horse delivery made satisfactory. Many of the trucks had to be unloaded and towed home."

National Biscuit Company: "Ninety-three horses, no trucks. Horses so satisfactory no danger of us substituting them."

D. B. Martin & Co.: "One hundred and twelve horses, fourteen trucks. The trucks absolutely worthless during the snowstorm; horses working every day."

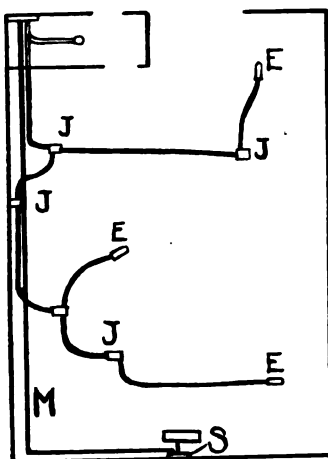
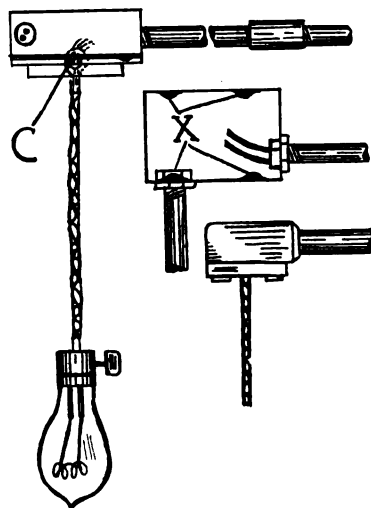


FIG. 5—SHOWING PLAN OF CONDUITS AND ALL DETAILS OF WIRING





THE OHIO HORSESHOERS MET AT AKRON AND HAD THEIR PICTURE TAKEN IN FRONT OF THE FIRESTONE RUBBER COMPANY'S PLANT

S. & S. Beef Company: "Twenty-eight horses. All at work; had three trucks, but found them so undependable and so thoroughly misrepresented, returned them."

Samuel Bell Sons: "Eighty horses, two trucks. No trouble at all with the horses; trucks very unsatisfactory, get stuck nearly every time they go out in the storm; horses much the better."

Jno. J. Felin & Co.: "Ninety-seven horses, one truck. Horses out every day, truck in the shop every other day; costs as much to run the truck as eight horses."

Peter Cavanaugh: "Eighty horses, one truck. Horses can make delivery anywhere; truck a source of trouble and expense since the day I purchased it. Would that it would only jump overboard or burn itself up without doing any other damage; no more trucks for me, but resolve to stick to horses, as I could always use them to great advantage."

James Irvin: "Two hundred horses. All at work during the storm; no auto trucks, and what is more won't have any; saw too many good fellows go broke trying to keep them up. You would want to be a millionaire to pay repair bills on them."

Atlantic Refining Company: "Two hundred and fifty horses working, ten auto trucks. Trucks not doing any good, cost so much more to operate than horses; absolutely worthless in the storm."

Adams Express Company: "The auto delivery is much more expensive than the horse-drawn vehicles; found it necessary to equip all our autos with shovels, in order to dig machines out of snow when occasion required."

COMMENT BY EDITOR OF *Our Dumb Animals*

We reproduce these statements, not because we do not wish that the auto truck could do the work of the draft-horse and free him from his heavy burdens, but because of the falsity of the assertions so recklessly made on every hand that the auto truck is driving the horse out of existence. These statements, and the nonsense written about the vanishing of the horse from our streets, are not only in the face of the testimony of men who know, but also in the face of the government reports as to the number of horses in the country. According to the U. S. Department of Agriculture, Farmers' Bulletin 575, February 7, 1914, there were in 1880, 21 of a horse to each inhabitant of the United States. In 1900 the percentage was .24, in 1910 it was .22, in 1914 it was .21. But the per capita number of all farm animals has decreased

since 1900. In horses the decrease in the past four years has been 3.5 per cent; in milch cows 4.4 per cent; in all cattle 19.2 per cent.

Consider such figures as the following and then compare them with the same figures for horses. In 1880 there was .72 of a beef animal to each inhabitant; in 1900, the per cent was .89; in 1914, .57. In 1880 there was .25 of a milch cow to each inhabitant; in 1900, .23; in 1914, .21 per cent.

It is greatly to the interest of the auto truck companies to advertise their trucks to the discredit of the horse. It's time the horsemen and the harness and carriagemen, who report a constantly improving business, combined to give the horse at least a fair chance to be heard. Apropos of all this a large concern doing business in Brookline, Massachusetts, employing several hundred horses, told us that during the recent storm, their three auto trucks collapsed on the road, that horses had to be sent to deliver the goods they had started with and to haul the trucks in under cover.

The horse is here in larger numbers in Boston than ever, and in larger numbers on the farms of Massachusetts than ever (see Farmers' Bulletin 575), and while we could wish him freed from slavery and

oppression, we purpose to continue to plan for his presence and his better lot as man's most faithful and valuable servant.

Shoeing the Horse Correctly and Incorrectly

M. E. W.

A horse without good feet is nearly useless, therefore the feet of the horse should be looked after with the greatest of care. To keep the feet in good condition, we must see what nature has done for the horse. In his natural state the horse does not need shoes, nature gave him a tough hoof—composed of the shell, the sole and the frog.

The secret of good shoeing is to keep in mind how the wear comes on the feet when the horse is in his natural state. You will see that the sole of the foot is of softer material than the shell and wears away faster, which leaves most of the weight and wear to come on the shell and frog. When the shell wears down, the sole gets thin, the foot gets sore and the horse becomes lame and has to be shod. The owner now takes the animal to the shop to be shod. The blacksmith (not all, but $\frac{1}{2}$ of them), will take a rasp and level the foot up a little, and in doing this he rasps away the shell which is already worn too much and nails the shoe right on the sole which is now sore from the pressure on the ground.

Now the trouble begins. The horse's feet are sore and the shoe is nailed right on the sore spot and



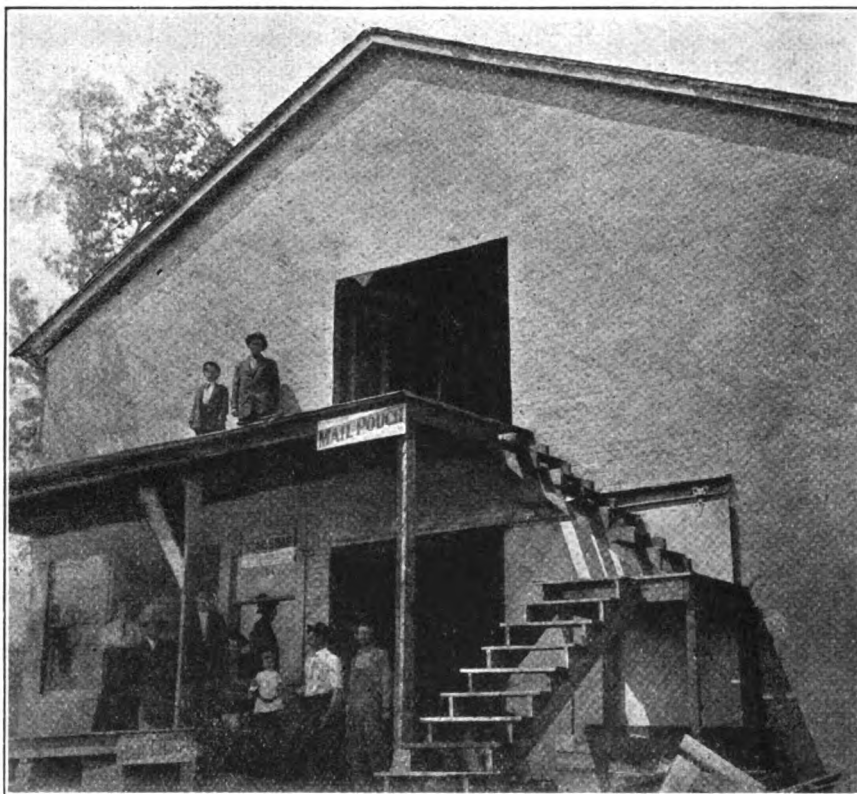
MESSRS. BENNINGER & SON OF PENNSYLVANIA DO A GENERAL SMITHING BUSINESS



keeps irritating it. In a few days the shell grows slightly and the horse travels a little better. He gets along pretty well now for a while, until the shoes either wear out or come off. If the animal goes four or five months before this happens, the owner says the blacksmith is a good one and takes the horse back to him to shoe again.

This time the shell and sole have grown out long, so he rasps off the shell and sole; the shell being the harder it cuts away faster than the sole, so the shoe is again nailed on with most of the weight on the tenderest part of the foot. This treatment causes fever, and fever dries out the foot and causes contraction. The horse now becomes lame, the owner takes him to the blacksmith and the smith takes off the shoe, digs around in the foot and finally discovers a red spot in the inside corner or heel. He says it is a corn. He cuts this out, digs a hole up in the sole as far as he dares, and puts the shoe on again; leaving the heel a little loose so as to take the bearing off the corn. This is the first thing he has done to relieve the horse.

The horse goes a little better this time and the owner says the blacksmith is a "cracker-jack." By the time the horse needs shoeing again he is as lame as ever. This is a natural consequence, as the hole where the corn was dug out has let the shell draw together and causes

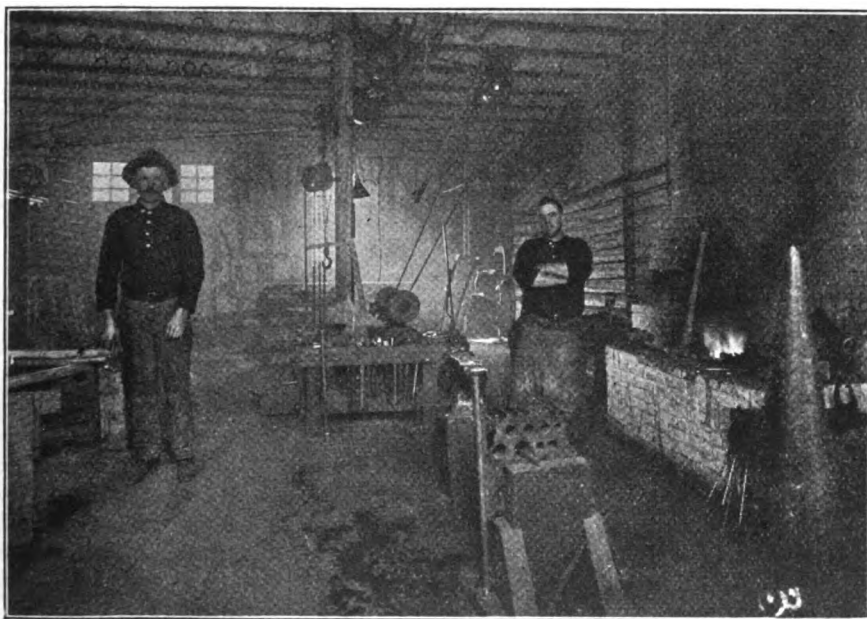


THE GENERAL SHOP OF MR. A. W. WOOD OF WEST VIRGINIA

the corn to be larger. The corn is dug out again and the shoe nailed on again as before, and the horse goes better again. This treatment is kept up right along; the horse gradually grows worse, is finally useless and is traded off to be pounded around by jockeys, or is sometimes sent out to pasture to rest up. You

will agree with me that this is the course of the horse as shod by $\frac{1}{10}$ of the blacksmiths. But, you ask, how is this to be remedied? the horse must be shod so we can use him. I have told you how $\frac{1}{10}$ of the blacksmiths shoe the horse, now I will tell you how the other tenth shoes him.

As I said before, the shoer should keep in mind what nature does. The horse comes to the shop to be shod for the first time. His feet are worn down as before stated, but this blacksmith is very careful not to let the shoe rest on the sole of the foot. The shoe is made big enough to fit the foot, so there is nothing to be cut off, and you will find that the horse goes away from the shop as free as if he had never been lame. When the horse comes back to be shod again, the blacksmith takes care to dress the foot down in good shape; leaving the shell a little longer than the sole and dressing the sole out so as not to let the shoe rest on it. The shoe is made level and not beveled in like a dish which crowds the foot together every time the horse puts his weight on it, but is leveled so as to give the same bearing as he had when he was barefooted. A



THE SHOP OF MR. W. C. STANTON OF ARIZONA, SHOWING POWER EQUIPMENT



horse shod in this way, with any reasonable care of the feet by the owner, will never have any corns.

This is the way to shoe a horse with good healthy feet, but when shoeing horses you come across bad feet as well as good ones, and I dare say you will find the bad ones more plentiful than the good ones. So we must study what to do with the bad feet to relieve them. I will take up the contracted feet first. You will find the contracted feet hard, dry and grown together. They should be dressed down well. This is a hard job which most blacksmiths dislike to do, and so neglect this important part. If there are corns in the feet, do not cut them out by digging a hole in the foot, but dress them down nicely with the rest of the foot, bevel in the shell so the outside is longer than the inside, and dress the heel down so the shoe will not rest too heavily on it. Remember that the red spot you see in the bottom of the foot is not sore at the bottom where you see it, for there are no nerves in the sole, but the trouble is where this blood starts from. The shell has drawn together and squeezed the

taken to get the foot and the shoe beveled the same, and not to let the shoe rest on the sole.

Why Axles Break

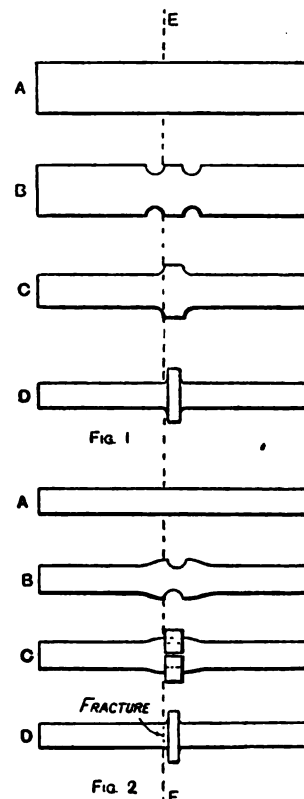
(An English Explanation)

A. K. in *Work*

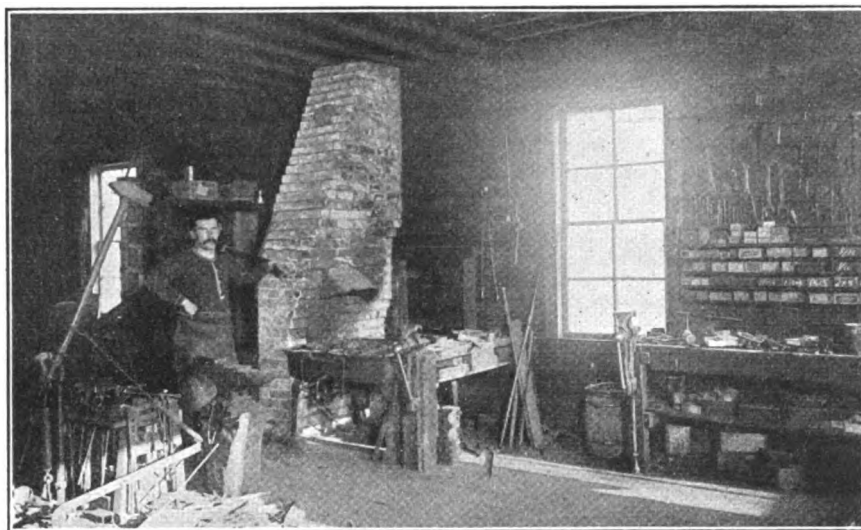
A few weeks ago a fatal accident occurred in Enfield Highway, which was proved after the inquest to have been caused by the wheel of a cart getting into the tram rails and breaking the axle, thereby pitching the occupant out, and causing his death. Many accidents of a like character are constantly happening.

The accompanying illustrations show the difference in the forgings of axles for different vehicles in two distinct shops. Fig. 1 shows how it would be forged in a large shop where steam hammers and other appliances are used, making it quite easy to make, and when finished being quite solid and sound. Fig. 2 shows how in a small shop, where such axles for small vans, etc., are made; not exactly bad workmanship, as these smiths are victims of circumstances, and, as you know, better metal can be used in a large shop where the

as in a small shop. In each case A, B, C, and D show the four stages in which it is made before the blacksmith has done his part, and following



WHY AXLES BREAK



THE VILLAGE SMITH—MR. JOHN ROLLER OF WISCONSIN AT THE FORGE

arteries so the blood could not flow through them freely; so they have become ruptured and the blood works out through the sole where you see the red spot which is called a corn. Now, in putting a shoe on this foot, you must keep this in mind, and bevel the shoe so as to spread the foot where the weight comes onto it. Great care should be

steam hammer does the hard work more so than a small shop, where the best metals are not always used. A man after he has been blowing the bellows to get the forging hot, gets his rest by coning and banging away on something that he does not want to be of the best quality.

Beginning with Fig. 1, this is as forged in a large shop, and Fig. 2

the line EF will show where this fracture is, and how it is caused. Fig. 1 begins with a large-size piece of metal, getting the collar solid by fullering on each side (see B), and then drawing the metal down under the steam hammer (see C). The rest is easy. Fig. 2, not having the means of drawing this metal down, a smaller piece has to be upset where the collar comes, and then fullered round (see B). More often square iron is used after being fullered round as shown at B, and in fullering a little too deep, gets below the actual size wanted when finished.

The best of workmen cannot guarantee this collar welded at the bottom C, and the consequence is, that when this collar is turned up, if not to the eye, it is there. A fracture caused by this collar at every blow works farther into the solid metal, and when turned up to clean the collar, part of the collar has become part of the spindle (see the dotted lines in D, Fig. 2), and this fracture, perhaps not seen by the eye, is at the most critical part of the axle. In fact, it becomes like a piece of metal nicked round by a



chisel. The consequence is that if a sudden drop or wrench happens, off it comes; but if the right metal were used and forged as Fig. 1, a carriage, etc., could be dropped from a high distance or wrenched in any position, and would not break.

Thoughts On Timely Topics

By THORNTON

Caustic Censure and Cheery Comment

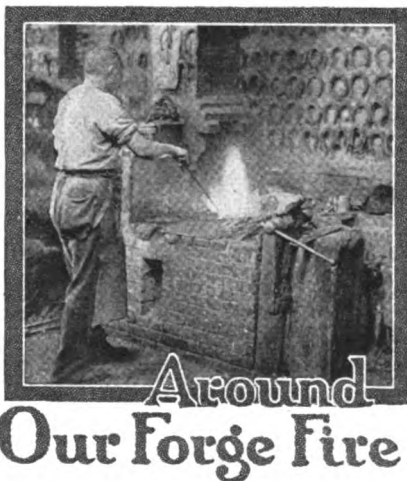
COAL BY THE CARLOAD.—Ever since I've been able to scrape enough money together at one time, I've been getting my coal by the carload. It's the only sane way, seems to me. Why get a few bags at a time, pay two or three times the price you should pay, simply because you haven't foresight enough to get a quantity? The money invested in a car of good coal will earn more than if put in the bank. If you cannot use a car alone get another sledge-swinging to go in on it with you. Or get two or three smiths to go in on it with you. Talk to them about it, anyway. It will do you all good, even if nothing results.

THIS AUTO QUESTION seems to cause some smithing brains to work backward instead of forward. Some smiths seem to see the auto question in about as clear a light as we used to have on the old horse cars that ran down the main street years ago.

Of course, other smiths see the auto situation in a clear, unobstructed light, and they are handling the business throttle and steering wheel accordingly. But there are a goodly number of hammer-handlers whose eyesight is sadly in need of repair. They seem to think that when auto-repair work is suggested as a part of their line, they should take down all other signs and call the shop a garage. There is a possibility of not devoting enough attention to business, and then again it is possible to push on one side of the business so hard as to topple the whole structure into the ditch. It's a good idea to sit back, occasionally, and get a true perspective of conditions. Some smiths stand so close to their shops that they cannot read their own sign. This auto proposition is a real, live one for the real, live smith; but don't let auto enthusiasm run away with the business. Your regular line—horse shoeing, blacksmithing and vehicle work—still deserves your attention, and your regular customers are still

entitled to your careful consideration, even if the auto customer is in a hurry. So, don't let the auto run away with you. There is a reasonable course to pursue in this matter, and that is the only one.

THE WAY TO MAKE COLLECTIONS GOOD, is to collect. I've received several complaints, recently, from smiths saying they have to wait six months or a year at times for their money. Of course, there are conditions and times when customers, especially farmers, cannot pay, Johnny-on-the-Spot. Crop conditions, harvest conditions and sale conditions determine in a great measure the lack or abundance of the long green; but these conditions need not be forcibly thrust upon the poor horny-handed son of the forge to bear. The smith cannot afford to finance the farmer; but when credits are extended for from six to twelve months that is exactly what the smith is doing. It is unfair of the farmer to expect it and it is unbusinesslike of the smith to allow it. The bank is the proper place to go for financial help—refer your unreasonably long credits to the bank. Collections are just what you make them—do you find them good or bad, right now? A bit more energy expended in the credit end will insure a larger working fund.



Benton Scatters a Few New Recipes

Benton was quietly enjoying a Perfecto, while the Editor was busily engaged with some photographs, when Burt Woodward came in with two pieces of round steel.

"Just looking for you," exclaimed Burt when he saw Benton. "I want your help on this proposition. I've made up this bright piece to match this black stock for some kind of a thing-a-ma-jig over to old man Crosset's plant, and now I want to match the color. You see this black piece isn't painted or japanned, and it's a puzzle to me just how to go about the work."

"Well, you seem to be up against it,"

returned Benton. "Let's see what we have in the book, Burt—I think I can help you out"; and Benton thumbed over the leaves of his notebook.

"Here is just what you want, and it's simple, too." Then, reading, Benton continued: "To produce a brilliant black on



MAN'S MOST FAITHFUL ANIMAL FRIEND

polished steel, burn mutton suet on the surface, and a lasting black will result. I would suggest your heating the piece you want blackened, then apply the suet and then heat again to burn the color in permanently. If the color isn't dark enough with one application, repeat it until your pieces match up right."

"That's easy. I had an idea I'd have to go to a lot of fussing to get these pieces to match," and with a "thank you," Woodward went out.

"Say, Benton," began the Editor after Woodward's departure, "can you give me a good recipe for a moisture-resisting glue? Here's a reader who seems to have difficulty with his sanding drums and belts. The sanded surface softens up in damp weather and he naturally has more or less trouble in using his sanding machines during a wet period. Can you suggest a remedy?"

"Well, a moisture-resisting glue may help" returned Benton. "Here's a good recipe for such a glue. The glue should be mixed with as little water as possible. For one part glue take an equal quantity of rosin and a fourth part red ochre. Another recipe that I think would be suitable for the purpose is a cement made of equal parts of shellac, white rosin and carbolic acid crystals. The shellac and rosin are melted first and then the acid is added. This should also prove a practical solution of your reader's problem."

"How about a marine glue or cement?" questioned the Editor.

"I can give you a recipe for a good marine glue; but I hardly think it necessary in this instance," said Benton, looking through his book. "Here's a marine glue—take one part of indiarubber and heat it gently with twelve parts of naphtha. After mixing, add twenty parts of powdered shellac. Then pour on a slab to cool. When ready to use it, heat to about 250°, and apply as usual."

"Well, that should give our reader enough to experiment on," said the Editor as Benton closed his book. "There are no doubt other of 'Our Folks' who are having difficulty with the softening of the glue on their sand drums and belts, and a little experimenting with the recipes you have will solve the problem."



The Old Flag

By WALTER G. DOTY

Let it quietly wave o'er the breasts of the brave

Where they sleep in the mountain or dell,
Or, high on the staff, let it dimple and laugh

In the breezes that love it so well.

Oh, banner of light, with your crimson and white,

With your field of the heaven's own blue,
And your glorious stars brighter made by the scars

That our heroes have suffered for you:

Float ever, droop never, forever, old flag!

Though the armed world assail you,

What coward would lag

To rise in defense of our beautiful flag?

By a thousand campfires have the vows
of our sires

Ever been that the flag should still reign;
And they battled and bled till the rivers ran red,

But the flag floated free from all stain.

Let us keep it unfurled to enlighten the world—

Right's emblem as ages go by.

Ever glad to the sight is that banner so bright,

As it ripples in glory on high.

—National Magazine.



Heats, Sparks, Welds

Read useful things—and make use of what you read.

It doesn't pay to be too busy. Take time to read and to think.

Whether you're stuck on a job or stuck on your job, let "Our Journal" help you.

And while discussing costs, remember that a job well done the first time costs less than one that has to be done over.

The date on your insurance contract—what is it? Fire usually waits for the policy to lapse, so look up your contract—NOW.

It's not so much the amount of work a man does, as it is the quality of it and the manner in which he does it, that determines the success of the man.

When we reminded Tom of the arrival of the annual civic "Clean-Up Week," our

friend said: "Ain't got nothin' t' clean-up." Tom always was clean-up weak.

Goethe, the German master of literature and philosophy, once said, "He is happiest who finds his happiness at home." And Goethe knew—because he never found it.

"It's a big thing," said Sammy Smiles, the jolly salesman who visits our shop, "to have your job look good to you. People like to deal with a man who's stuck on his job."

Many a man has missed a picnic because he was certain a cloudy sky meant rain. Many a customer is close-fisted, but don't be certain he is a "dead beat" or you may "miss" him.

The most useful, and truly the most appreciated, education is the one you get through your efforts to make a living. It is the study of every-day life which increases your efficiency.

"Anybody that can drive a nail can shoe a healthy foot without danger of doing much damage," says Ol' Bud Whipple. "But it takes a real shoer to shoe a horse that's got bad feet."

There's room at the top of "Our Honor Roll." Better take out a term subscription and save your money. A ten-year order will relieve you of further trouble for some time, and you save just half your subscription money.

What do you suggest for the improvement of "Our Journal"? We want to grow, to expand, to improve—continually, everlastingly, persistently. Send in your suggestions today. Let us know what you like; what you want; what you dislike.

What ads are you answering? We like to know what interests you in the advertising section as well as in the editorial section. Tell us your impressions; what you think of the advertisements; which ones you answer; what advertisers you are dealing with.

Don't let the month go by without getting one of those "Blacksmith" pictures. Read the announcement in this issue—it tells how to get one of these beautiful pictures free. Get busy now! You'll find the picture well worthy of a frame and of a place in both home and office.

How's your inventory—up to date? Oh, yes, a smith should have an inventory of his shop. Suppose you burn out—suppose you want to sell—suppose you want a loan—suppose you're figuring costs—suppose anything in a business way. A smith must have an inventory to do anything right.

Friend Tom is certainly well named. We found him industriously occupied taking down the shop stove the other day. "Some-what tardy, aren't you, Tom?" we asked. "Well, that's my name, ain't it, Smarty?" replied our friend, as he continued picking up pieces of grate, stove pipe and other parts where they had fallen.

Try to deliver a bit more satisfaction, service and good-will than your customers expect. It will clinch business that other methods fail even to attract. Make your service overshadow the price attractions of your competitors, and you'll have things your own way. Service makes for business growth—it's the sunlight of trade that causes the plant of business to expand.

When you extend credit, do it in a way that is a credit to your business. Find out something about the man who asks for credit—but find out before, and not after. And when you do find out, extend credit accordingly. If your reports are not favorable, be cautious about credit extensions. Don't give credit to anyone who has

"beat" your fellow business men. Chances are against you.

How long must we wait for that article or item from you? This is your paper. We want you to have a hand in its publication. When you do an interesting job—a hard job—an out-of-the-ordinary job—let us know all about it. We want to know what you are doing—the prices you get—the conditions in your locality. Write an occasional item—either long or short—but write it. We want your co-operation.

A Plea for Fairness.—The following is a reprint of an article that will interest every blacksmith. It was originally published in a newspaper. We are indebted to Mr. G. A. Kugler of Nebraska for the clipping:

COME, LET US REASON TOGETHER

Solomon, when building the great temple in Jerusalem, called his men—such as the stone masons, brick masons and silver and gold smiths and all other tradesmen, about him. After they had gathered around him he said:

"Where is the blacksmith? We cannot do without him, for our tools he must make; our chisels he must sharpen. Go call the smith here with us."

Now Solomon was called a wise man and this took place 2000 years ago and the smith then at this time was among the leading mechanics of the world and filled a place in the world that no other could fill. So it is today, yet not so recognized by a good many people. Who and what is a blacksmith? Is he a human being among men, who works at the forge in a smoky, black-looking shop from morning till night, doing the work that no other can do, sharpening and repairing such tools as may come to his shop, with everybody in a hurry and wanting his work done right away? The smith, wiping the sweat from his brow, says: "Sir, I cannot do it for you today, for I have more than I can get through with, but I will have it for you tomorrow."

Then cuss words from his customer follow sometimes, but on the morrow the work is finished and the customer calls and as he leaves the shop he says "you can charge this." Then after six, eight or ten months is passed and after a statement (called dun) has been sent to him, the customer aforesaid walks into the shop and pays his bill the while he cusses the blacksmith for having dunned him, and vows that he will patronize him no more. He forgets that the smith has earned the money paid and it has long been his.

Now, Mr. Customer, let us reason together. If the smith owed you, what would you do? If the smith sold you four wheels that cost \$20 and you asked for credit and got it, haven't you got \$20 of the smith's money without note or interest or security, and when you let it run for three or four months without settling, who ought be mad when a dun is forced to be mailed out—you or the smith? Is it any accommodation to receive credit? Yes. Then settle in time and avoid duns. We cannot do business without credit, but credit is abused. The smith has his bills to pay for—perhaps the very ones you have had charged. The smith can't live on book accounts or promises to pay, but he must see cash. He must have cash. Now, Mr. Customer, can you get along without the blacksmith? If so, you are wiser and have more wisdom than Solomon ever had. The smith and you ought to go hand in hand. When you ask for credit, do not forget that payment should be made in 30, 60 or 90 days at least. Pay up often, then there will be no duns, no bad debts and no hard feelings. Let us reason together and be reasonable in all things.

A. Smith.



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An Association's Protection Against the Price-Cutter

The following letter comes to me requesting advice:

"Would you please inform me if a local association could at any time be justified, in its aim to maintain prices, and in the event that a non-member cuts prices, forcing the wholesaler to refuse to sell to this smith?"

As probably every other association in a town where there is a cutter

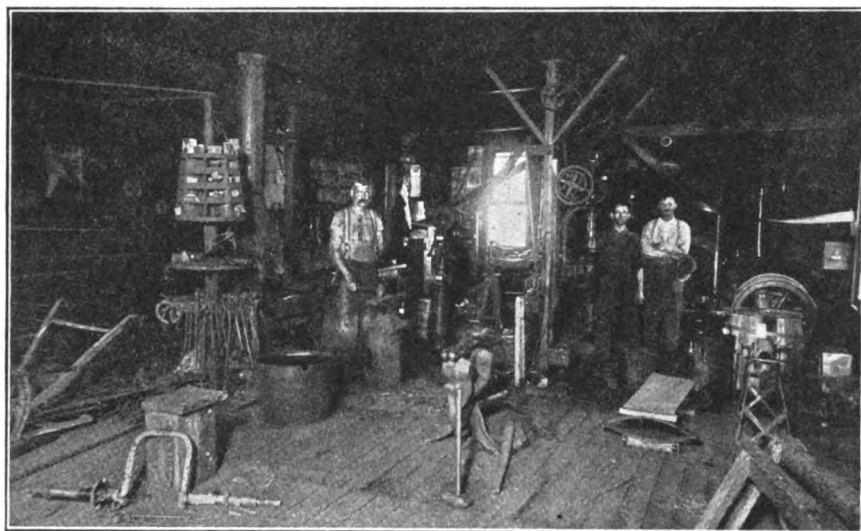
fair net profit. The question now would be, is an arrangement for a gross profit of 30 per cent reasonable or unreasonable on the given job.

This, however, is not the precise question we are concerned with. The real question is this: If the fifteenth smith sells and advertises the given article at a lower price than that provided for by the association's resolution, and thus destroys or hampers the arrangement and demoralizes the market, can the association legally bring pressure to bear upon the jobber or the manufacturer who sells the cutter, to com-

destroyed or injured by the above methods brought suit against the association and recovered large damages. Later, the Government joined the attack, the association and several of its individual members were found guilty and fined, and finally the association abandoned all of its restrictive plans. That case in my judgment decides this correspondent's inquiry, and is authority for the following general proposition of law: That it is an illegal restraint of trade for an association of business firms, who are being antagonized in some way by one or more non-members, to attempt to interfere in any way whatever with the latter's obtaining of supplies. If they make such an effort, the victim of it, whether it is successful or not, can in my judgment obtain damages, and if it is successful and somebody actually cuts him off, he can recover heavy damages.

Such a plan, under the law as it stands today, would be more than dangerous—it would probably mean inevitable disaster.

The only way to meet a situation like this, where the ground is being undermined beneath your feet by price-cutters who from reckless, ignorant or malicious motives, or from a false idea of what constitutes enterprise, are demoralizing markets and trade conditions, is to exercise the individual right of self preservation. In the case we have been discussing, the association of fourteen smiths might pass a resolution pledging its members, in their own interests and the interests of the general trade, not to handle any work which pays less than a certain gross profit. If by reason of the operations of a cutter the price of a given job becomes depressed, and it is no longer practicable to get a price which pays the percentage which the association has decided was the reasonable minimum, every member has the individual right to cease to do it. All that would be necessary would be a report from a committee, for example, that owing to local trade conditions, it was no longer practicable to do such and such work at a reasonable profit. This would simply be by way of information to the members; there would be no resolution to throw any work out, or to do anything—each member would do as he liked and there would be no compulsion whatever. Having agreed, however, that nothing less than a certain



THE POWER SHOP OF MR. WM. DONALDSON OF OKLAHOMA IS WELL ARRANGED

is asking itself the same question, I will devote somewhat more attention to the subject than I usually do.

I suppose a fairly representative statement of the problem is this: A is a town of 10,000 people, containing let us say fifteen blacksmith shops. There is an association of let us say fourteen smiths, one only remaining outside. The association decides that a given job must be done at a gross profit of say 30 per cent, in order to net the smith anything, and a resolution is adopted pledging the fourteen men to do it at that price. Whether this action is in itself legal or illegal has never been decided in precisely this form. The United States Supreme Court is on record with a decision that restraint of trade, which this would be, is illegal only if it is unreasonable. Formerly any such restraint of trade was illegal, even if the object was merely to save lives by insuring a

pel or persuade him to cut the cutter off?

This has been done many times in the past, but it can never be done again, in my judgment, until the law is changed. The precise question, as I now state it, has never come before the United States Supreme Court, but some of the United States lower courts have decided similar ones. For instance, take the recent case brought by the United States Government against the Southern Wholesale Grocers' Association. This organization was accused of working along the exact line of the above inquiry. It was an organization of wholesale grocers, and it brought pressure upon manufacturers to get them to refuse to sell (1) firms who did a retail as well as a wholesale business, or a retail business alone; (2) wholesale cutters and (3) regular jobbers who refused to join the association. Several firms who were



profit was fair, and realizing that his own labors of the work in question were netting him no profit, it might naturally be expected that every association member would cease doing the cut-priced work. How many would, would depend on their personal courage, loyalty to the association and the cause, and so on.

If fourteen smiths out of fifteen, or if any considerable percentage, were to cease doing work which a cutter had demoralized, on the perfectly logical and justifiable ground that it did not pay to sell it, all such questions as this correspondent asks would very speedily disappear, for the manufacturer whose sales were thus cut off would find a legal and effective way to cut off the cutter's supplies or get his promise to cease his demoralizing tactics.

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A Modern Iron Gateway in Kent, England

JOHN Y. DUNLOP

Considering the wealth of old wrought-iron work in England, it is with some reluctance that we leave it to consider modern examples. In the case of the example shown, we have the work of a local blacksmith, and the design is the work of the architect of the building. This gateway is a pleasing feature of the Nottingham Home for Old People.

Times have greatly changed since the days of early work in wrought iron; and modern work has suffered somewhat from the mingling of rolled and hammered iron. It is essential, if the whole effect of a gate or railing is to be in keeping with our earlier examples, that all the parts should be hammered. This means that the straight parts as well as the curved should be forged; as the introduction of milled iron in the straight parts with its regular setting at once gives a hard and mechanical appearance even to the best designed piece of work.

In the engraving, the great wrought-iron gates form a striking feature and constitute a fine example of present-day skilled metalwork. The double gates are hung on the wrought-iron posts which, being filled with scrollwork, are part of the railing. Each framed post is stayed at the back with heavy turn stays which have two scrolled supports sup-

porting the vertical members of the post at equal distances.

Over the top of the gates, a scroll band is formed, above which is raised a heavy scroll panel of conventional design and on the front of which is wrought the arms of the Ironmongers' Company of London. The elaborate

a stem is drawn down on the end of a rod of iron, after which enough is cut from the rod to form the leaf and hammered out. It is then reheated and hammered out flat. Next, the center rib is marked off in its wavy position and the variegated edge cut. The leaf is now curled, so



A MODERN GATEWAY OF KENT, ENGLAND, THAT IS VERY ARTISTIC

assortment of leaves on this part are those of the acanthus which have been used so much both in decorative and constructive work. One would naturally think that the reproduction of such leaves would call for an elaborate assortment of tools and appliances. But such is not the case; as this work is done with comparatively few tools of the simplest and commonest kind. An anvil weighing about 250 pounds, a cross-pened hand hammer weighing about two pounds, and a few pairs of tongs and pliers.

In the formation of the large leaves,

that at each blow it seems to assume more of the characteristic form of the acanthus leaf.

In making the scrollwork of the gate, the smith first draws a design of the work; then he takes a piece of string and bends it around the curved outlines of the scroll design, in order to obtain the exact length. The piece of iron is then cut off and the circular swells forged, set about and the scroll bent into its intended curves. This is continued, with repeated reference to the outlined design, until the correct and exact shape is obtained.



The methods of the ironworker undoubtedly vary in different countries, but, after all, the method of heating and hammering is of little account as long as the skill of the smith leaves our modern work in comparison with the ancient iron-work.

Blacksmithing and Wheelwrighting at The Hampton Institute Trade School

W. A. AERY

"Self-support must go along with Christian living. It is hard to be honest if you are starving. A man who can support himself is more likely to lead a Christian life."

—SAMUEL CHAPMAN ARMSTRONG

"If you don't believe that it takes some real, worth-while education to shoe a horse properly, then try to shoe the next horse you see." Wm. Hodges Mann, of Virginia, frequently uses words to this effect to give added force to his public appeal for practical, common-sense training of all classes for special service to the community. Hampton understands fully the importance of applying Governor Mann's idea to the making of blacksmiths and wheelwrights, as well as other tradesmen, teachers and farmers.

Why is it that blacksmiths and wheelwrights who are trained at Hampton meet unusual emergencies when they are thrown out in the world to make their own way as journeymen, as teachers of blacksmithing and wheelwrighting, or as independent owners of their shops? What is there in Hampton's system which promotes initiative, application and general efficiency?

From the minute a negro or Indian boy enters the blacksmith shop at Hampton he is put to work at his trade. He is shown how to move about his forge in a comfortable, natural manner. He is shown how to build a fire properly, and then he is assigned the task of building one which will stand the test of inspection. At every turn, the boy is shown not only how to do the work that the blacksmith must know how to do, but he is given the why and wherefore of the processes which enter into the blacksmithing trade and must be mastered.

The beginner is not merely a shop helper or handy man who mechanically does the striking for another man or simply waits on some superior. From the start, the blacksmith-in-the-making comes in touch with a system of instruction which abounds in common sense and practicality. He learns to do his work accurately and neatly. He learns his first lesson partly through imitation, for shop demonstrations are frequent and to the point. The student is encouraged to ask questions and to work out, with the help of his instructor, satisfactory answers. If the task, for example, is that of building properly a forge fire, then the properties of coal, the heating of iron and the control of the blast are some of the questions which receive careful attention.

Hampton takes boys who are "green from the woods," and by careful training, through tasks of graduated difficulty, develops tradesmen who learn to do the so-called common tasks of life with skill and understanding. The school itself, which is an industrial village, furnishes a variety of work which makes

work properly fitted. The axles are welded, the wheels are fitted with tires, and the springs are fastened or clipped to the wagon gear. The iron which is used on the wagon is carefully measured, worked into shape and properly fitted on the body and gear built by the wheelwrights. If work has to be done on a school boat, then the blacksmiths and wheelwrights, along with other tradesmen, are on hand to do the necessary repair or construction job.

When fire escapes and fire ladders were needed for the dormitories, the blacksmiths were assigned to the work. When ornamental iron work was called for in the construction of the new Y. M. C. A. building, Clarke Hall, and the remodeling of the principal's house, the blacksmiths were again assigned some difficult and important work. Then, again, the necessary repair work on farm implements and farm wagons, which are in daily use on the home farm, and at Shellbanks (the large school farm some six miles away from the main Hampton buildings) is done satisfactorily by the Trade School blacksmiths and wheelwrights.



THE SMITH SHOP AT HAMPTON INSTITUTE TRADE SCHOOL

it possible to give negro and Indian students the tasks which they need to develop their latent powers. Whenever a wagon is built in the wheelwright shop, it is passed to the blacksmiths to have the necessary iron

Hampton tradesmen not only do the repair and construction work for the school but they also do a considerable amount of commercial work. This includes, for the blacksmiths and wheelwrights, the making



of railroad and wharf trucks in some twenty-five styles, and the building and repairing of wagons, as well as a variety of carts and wheelbarrows. Attractive andirons, sets of fire tools, fire screens, well-made forging tools—these are some of the interesting products of the blacksmith shop.

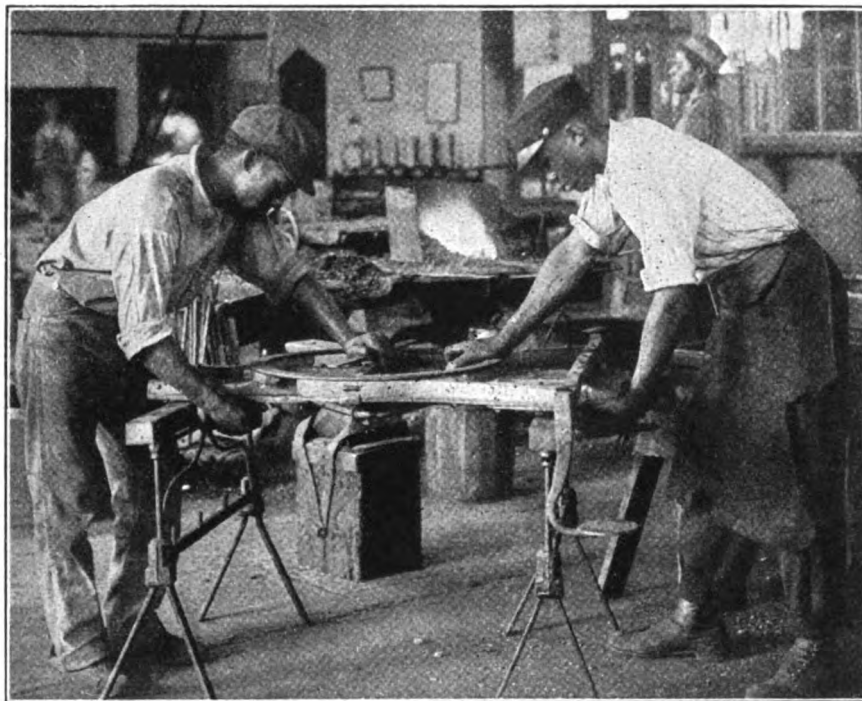
The boys at Hampton who take the regular course in agriculture, spend half a day a week for two months in the blacksmith shop; and there they learn to make the simple iron articles which are commonly used on the farm; including staples, links for chains, lap links for traces, and hame hooks. These agriculture boys receive drill in the principles of blacksmithing and are given enough practice so that at the end of their brief course they are able to do ordinary blacksmithing work.

To understand how the Trade School is able to do such a variety of blacksmithing work, with boys who are crude at the beginning, one must follow, step by step, the training that is offered in the Trade School. After a boy has learned to make his forge fire, he is given a piece of iron, about half an inch in diameter and thirty inches long, and is required to make a square point on one end. This apparently simple operation requires patient practice. Hampton insists that no work shall be accepted until it is well done. After a boy has mastered the making of a square point, he passes to the making of a round one, and then a flat one. Meanwhile, he learns how to handle the blacksmith's hammer; how to get the proper wrist and elbow motion, and how to handle his muscles to the greatest advantage. Then, too, he learns more and more about the handling of his forge fire. Such knowledge as the proper use of green coal, and of heat itself, becomes his own through the mastery of carefully supervised and graduated tasks. When the thirty-inch piece of iron gets so short that a boy cannot hold it without burning his hands, he receives a new piece of iron and is taught how to make a weld. Step by step, he turns out, according to specifications and blueprint drawings, some seventy-odd technical exercises during his first year of Trade-School work. Drawing out iron, making staples, bending rings, making a hook and eye, developing a gate hook, fashion-

ing bolts and nuts of various sizes and shapes, welding rings, constructing braces, chain links, square bands, making chisels, drills, springs, lathe tools, horseshoes, carriage steps,

their instructors, the *how*, *when*, and *why* of processes with which they have to deal every day.

The story of a typical Hampton tradesman follows: "A student who



IRONING A WAGON GEAR AT HAMPTON INSTITUTE

scrapers—these are some of the technical exercises in iron and steel which the Hampton blacksmith learns to do.

The students in the blacksmith shop take regular turns in shoeing the horses and mules that belong to the school. Nobody is ever allowed to abuse a horse or a mule. Every boy is taught to do his horseshoeing work with due regard to the animal's needs.

Along with the practical work over the forge and anvil, the tradesman studies from a simple text the facts concerning iron and iron working, iron forging and welding, fuels, steel and steel working. He also studies the use of the tools that the blacksmith needs in his every-day shop practice. The text, which is carefully studied, contains, in question and answer form, the facts which the blacksmith needs to know.

During the Saturday morning lectures and demonstrations, students take up in greater detail the technical side of their work, and learn the "ins and outs" of their trade by coming in contact with definite problems and by reasoning out, together with

now has a blacksmith shop in Richmond, Virginia, by his attention to business, settling his accounts promptly and general good character and habits, so impressed a salesman for a Baltimore firm with the value of the training Hampton students receive, that he has been recommending them for positions in Virginia and North Carolina for several years. He has also called attention, from time to time, to good openings for shops, and has helped some of the Hampton students to get started in business for themselves. He recently said that not one of the students he had recommended had failed to please or to make good, and that by their work they are inspiring confidence in their race."

Although blacksmithing and wheelwrighting are taught at Hampton as two distinct trades, every effort is made to show students the close relation of one to the other. The blacksmith, during his course, receives some training in wheelwrighting; and the wheelwright, in turn, receives some practice in blacksmithing. In a number of cases, a blacksmith will take, after finishing his



own trade, a year of special work in the wheelwright shop; while the boy who has received his wheelwrighting certificate will often take a year of special work in the blacksmith shop. The fact is recognized that the wheelwright and the blacksmith must work over many problems in common. For this reason, all that has been said concerning blacksmithing can be applied, with appropriate changes, to the work of wheelwrighting.

Technical work is given the wheelwrighting students, to teach them how to use their tools effectively and how to make the common and special joints required in their work; also how to select and dress timber and work it to given sizes. To do the essential operations, a boy has to use a number of different tools and woodworking machines—cross-cut, rip, and band saws, planer, jointer, shaper, mortiser, turning

does this or that. As a part of his work, he must lay out full size drawings in the shop.

Later in the course, the wheelwright applies his technical knowledge to commercial work—the making of railroad and wharf trucks, the building of carts and wagons, the repairing of carriage and wagon bodies, the putting on of rubber tires, making new rims, re-spoking wheels and doing general repair work. On the repair jobs, boys labor together and thereby learn to develop initiative and the ability to work well with their fellows.

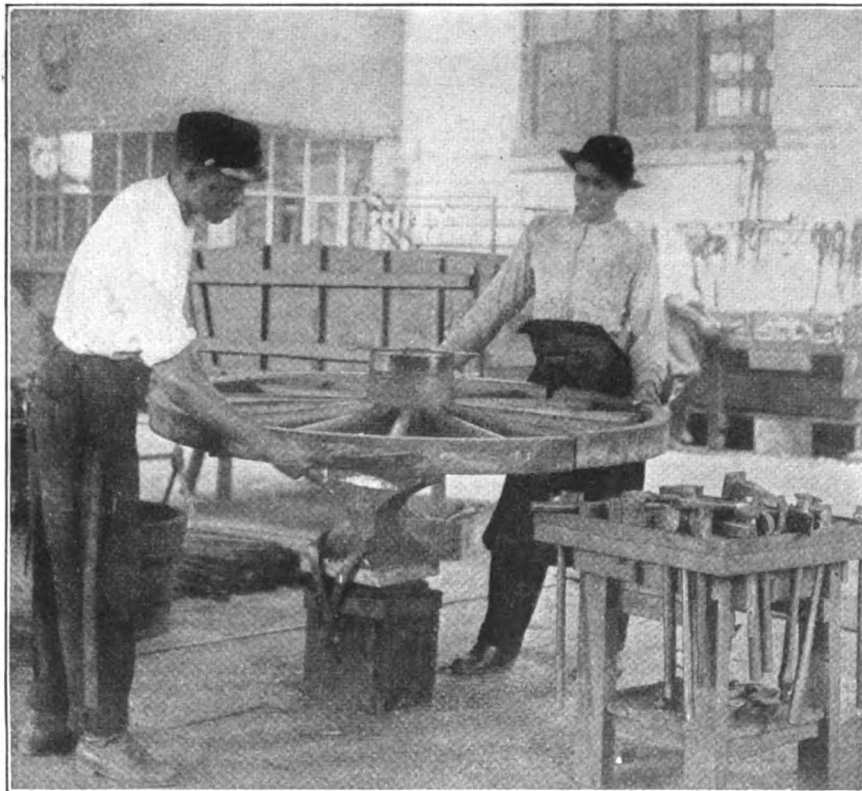
The wheelwrights have good tools to use and also good general equipment for all their trade work. They are required to take the very best care of the material and tools that Hampton has placed at their disposal.

The shop talks cover such matters as the care and dressing of tools

and handling of timber. Students keep written notes and sketches of the shop talks, which are regularly given every Saturday morning and, indeed, whenever some important question comes up during the working out of a regular wheelwrighting problem.

Wheelwrights and blacksmiths when they leave the Hampton Trade School can readily find work as journeymen in the South. The negro or Indian boy who is prepared to do his trade work well does not lack the opportunity of securing profitable employment. The demand for skilled workmen is growing.

The students are encouraged to return to their home communities and there put in action the ideas which they have gained at Hampton. Service and efficiency are emphasized at every turn during the courses which are given in the Hampton Institute Trade School.



HAMPTON BOYS FITTING RIMS TO A WAGON WHEEL

lathe, and boring machine. Then there are working drawings of a variety of joints which are made so as to give training for wagon work in which some joints must not show. When a boy builds a wheelbarrow he must know at every turn why he

the proper methods of laying out work, cutting and fitting timber for regular wheelwright problems, discussions dealing with suitable materials for the various parts of wagons and carriage construction, cost of material and labor, seasoning

Electroplating: Theory and Practice

E. V. S.

As a side-line, electroplating is one that not only brings profit but contains a certain joy of accomplishment that gives an added zest to the work. The process is delicate and painstaking, but if done properly, beautiful to behold. It jibes nicely with the smith's line, as there are often jobs upon which a good finish is desired; such as bicycle parts, auto parts, special tongs, pliers, screws, nuts and a multitude of objects which are vastly improved by a good nickelplate. Then there is the household silver and cutlery that can be renewed and, going into the finer work, the plating of jewelry, and so on.

Theory

Electroplating, as defined scientifically, is the plating or covering with an adherent coating by means of electrolysis. More completely it is "the art or process of covering any electrically-conducting material with an adherent or lasting film of metal, in a bath containing a solution of that metal, by means of an electrolytic action induced by a current from a battery or dynamo." These technical definitions may seem rather vague or



difficult, but will be made clear as we proceed with the subject.

It is not absolutely necessary to have any knowledge of chemistry or electricity to do electroplating; but the better posted one is, the more he can accomplish. The more one

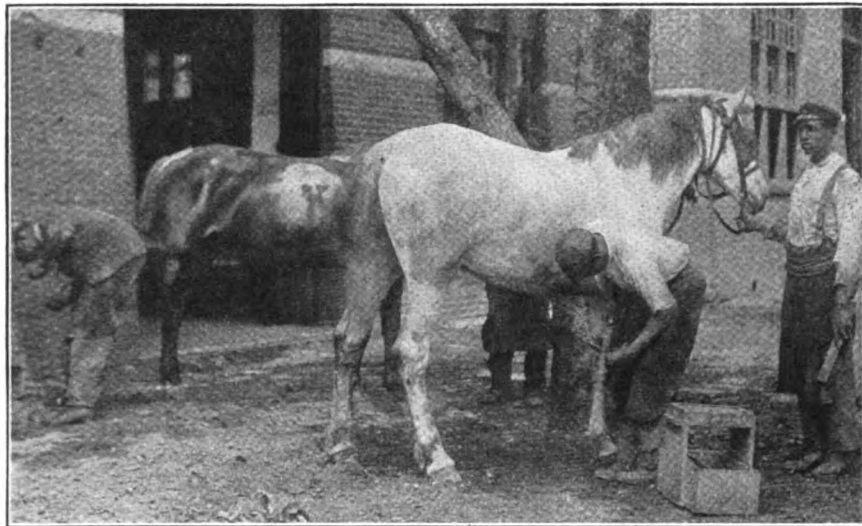
Now take the battery as the pail of water and the electric current as the flow through the pipe leading from the pail. To correspond to the pressure of the water on the bottom of the pail, we have the electromotive force which is commonly called the "e. m.

called "external" resistance. And so, in setting up a battery, we connect them with a minimum internal resistance and a maximum voltage or amperage, whichever we wish.

The Battery Connections

Fig. 2, A (next page), shows the cells arranged in what is called a "series" connection. They are connected with the positive element (carbon) of one joined to the negative (zinc) of the next, and so on; the two free ends being attached to the main circuit. (The batteries under consideration are "dry" batteries; they are *not* the best for electroplating, but lend themselves easiest to explanation.) In this arrangement, the current generated in the first cell must flow through the second, and so on. The e. m. f. or voltage of one is added to that of another. It's just like setting one pail of water on another; in which case we increase the pressure. But this method increases the internal resistance, as the current is obliged to flow through each battery and traverse all its members.

The parallel or multiple grouping of cells has a different effect. In this (shown at B), all the negative poles



THE HORSES AND MULES ARE SHOD WITH DUE REGARD TO THEIR NEEDS

understands the why and how, the less will be his troubles and the greater his success.

The Laws of Electricity

Before considering the actual process of electroplating, then, it is well to briefly consider some of the fundamental laws of electricity—the agent or means of this process with which we are directly concerned.

The current used in electroplating is derived either from voltaic cells (batteries) or dynamo-electric generators (dynamos). If there is power available in the shop, it is the most economical in the long run; although it is not exactly suited to the needs of the electroplater, as we will show later. Generally, a number of cells are connected and used as the source of current. The actual connections of this battery of cells must be observed carefully, as they determine the flow of current in the electric circuit.

For the sake of clearness we will compare the electric circuit with the flow of water in a pipe. Fig. 1 shows a pail of water with a pipe in the bottom. The higher the water stands in this pail, the more rapidly the water will flow through the pipe. It makes no difference if the pail is as large as the dotted lines show; providing the water level is the same.

f.," or voltage. The rate of flow of the electric current corresponds to the rate of flow of water and depends upon the pressure (voltage) of the battery, just as the rate of water in the pipe depends upon the water above it. As the rate of flow is measured in gallons per minute in the water pipe, the rate of the electric current is measured in amperes. If we put a valve in the water pipe, we can regulate the flow of water (the current) by opening or closing the valve. In the same way, we can put a valve in the electric current by which we can vary the current from the battery by introducing more or less resistance. This resistance has a standard of measurement, the ohm. The resistance box has the technical name "rheostat," and can be varied at will.

In short, then, the pressure of water is measured in lbs. per sq. in.; electric pressure is measured in volts; the rate of flow of water is measured in gals. per min.; the rate of flow of electric current is measured in amperes, and the resistance made to this flow is measured in ohms.

There are two resistances to be considered in a battery; that of the cell itself, called "internal" resistance (the carbons, zincs, etc.), and that of the circuit (wires, solutions, etc.),

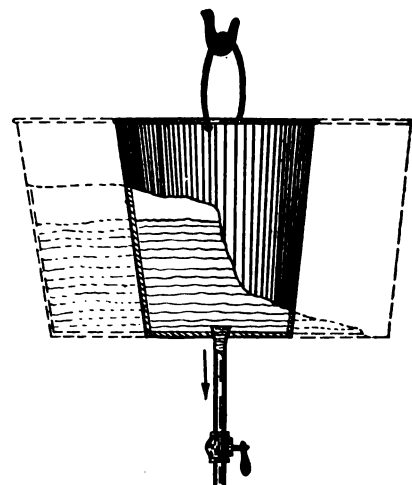


FIG. 1—THE FLOW OF CURRENT IS LIKENED TO THE FLOW OF WATER

are joined on one wire; all the positive on another. This is called "joining for quantity." The force (or voltage) is no greater, but the internal resistance is decreased and the volume of current increased in proportion to the number of cells. The voltage or e. m. f. is no more altered than would be the total water pressure produced by placing three pails with the same water level and connected to the same pipe. There



would be more water but no greater pressure.

In the illustration, C shows the series-parallel or series-multiple connections. This arrangement unites two or more sets of cells, joined in series, into a parallel connection. In this case, the internal resistance is twice that of B or parallel, and one half that of A or series. And the voltage is that of the number of cells joined in series (in this case, two), which is twice that of B. This is the same as if we took four pails, put two each, one on top of the other, and then connected the whole to one pipe.

We can calculate from the law of Ohm, which says that the current is equal to the voltage divided by the resistance, that with a heavy external resistance we get the greatest volume of current from the series coupling and, with a low resistance, the greatest volume comes from the parallel, which at the same time gives the weakest voltage.

In electroplating, the voltage should be low and the volume of current not very high. It is evident from this, that the ordinary lighting current which delivers a moderate volume of current at 110 or 220 volts is unfit for the electroplater. The highest voltage necessary never reaches 10 volts for moderate-sized work, while most of it is done at 3 to 5 volts. It is necessary, if any extensive work is undertaken, to have a rheostat to control the current; also a voltmeter and an ammeter for reading respectively the volts and amperes. However, for simple work we can dispense with them and use our knowledge in connecting up the batteries according to the work on hand. Therefore, when we have a heavy external resistance (which means there is a large amount of work in the circuit), we connect them as at A—the series coupling. With a low external resistance (a small amount of work), we use less batteries and connect them as at B—the parallel connection. (The series-parallel is an all-around arrangement, but is not used in electroplating where a specific current is needed.)

Types of Batteries

There are various types of cells, wet and dry, and the wet cells may be of single or double liquid. There are as many special kinds of electric

batteries as there are manufacturing concerns; and it would consume considerable space if we attempted to describe even the commonest ones. The makers furnish complete descriptions of their products, and we advise writing for their catalogs; bearing in mind that higher-priced cells are likely to be worth all the money asked, and the cheaper ones cost more in the end. This rule applies generally to chemicals and all supplies. The beginner is advised to get as few articles as possible, and to get the best;

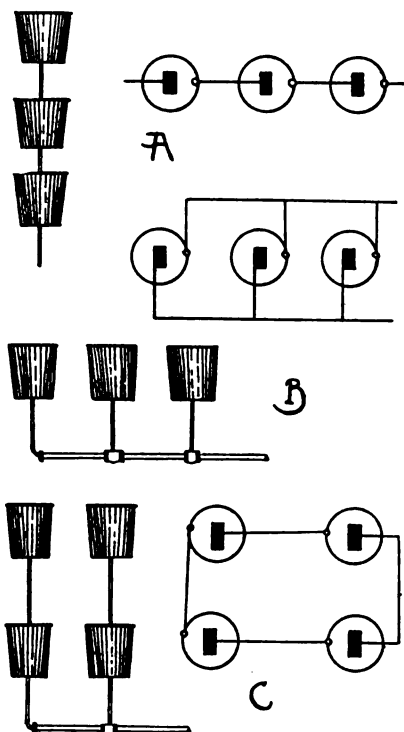


FIG. 2—HOW BATTERIES ARE GROUPED TO PRODUCE VARIOUS RESULTS

then to use them carefully, so as to get the greatest value out of them.

Returning to the battery question, what is known as the Bunsen cell (shown in Fig. 3), is considered best for all-around electroplating, because its electromotive force is high; enabling it to pass through high resistance. Two or three large Bunsens in series are enough for all ordinary purposes. Dry batteries may be used, but they deteriorate rapidly and, once used, cannot be renewed like the wet cell. If you have a gas engine in your shop, and intend following up the electroplating line, we heartily advise purchasing a small dynamo. Due care and consideration should be given in the selection of a suitable machine.

The Process

Having gained some idea of the electrical equipment necessary, we will now turn our attention to the process itself. We have defined electroplating in the second paragraph of this article as the deposition by electrolysis from a metal in solution upon another. Fig. 3 is a diagrammatic illustration of the process. The current from the outgoing or positive pole of the battery goes to the anode of the electroplating solution. Anode is a word derived from the Greek *Ana*—meaning “upwards”; and *Odos*, “a way”—an upward way. From the anode, the current traverses the solution to the cathode. Cathode is another Greek word, from *Kata*—meaning “down”; and *Odos*, “a way”—the way down. It is the cathode that is the object to be electroplated; from there the current passes back to the battery at the negative pole. The object is plated by the electric current throwing the metal from the solution onto the object receiving the deposit and simultaneously fretting off an equal quantity of a similar metal to that held in solution, from the metal plate (anode) that is suspended in the bath. Thus the solution is being constantly robbed of metal; yet it is being fed, and so its strength and power is maintained.

It must not be inferred from the theoretic explanation just given, that electroplating consists merely in taking any metal article, making the necessary connections, immersing the article in the solution and then taking it out bright with its new coat of deposited metal. There is much to be understood before successful plating can be accomplished. Strict attention to cleanliness and care in preparation must be observed in all operations. Practice is necessary toward turning out successful work, just as in any trade; therefore, do not be discouraged if the work doesn't come out A No. 1 at the first operation.

(To be continued)

The Human Factor In Business

E. ST. ELMO LEWIS

Burroughs Adding Machine Company

The automobile, the interurban car, the faster service on the railroads,



have a tendency to concentrate from a standpoint of distribution. As a friend whose firm annually distributes \$30,000,000 in shoes wrote me the other day:

"The time is fast approaching when the unit of distribution is going to be the county-seat. The concentration of trade is inevitable. There will be a few cracker-jack stores in the largest town in the county, and the small wayside stores that are now doing business will simply carry groceries, notions and a few other things to supply people who forgot something when they went to town."

The tendency of population is to go to the big towns to buy. The farmer, twenty miles away from Pon-

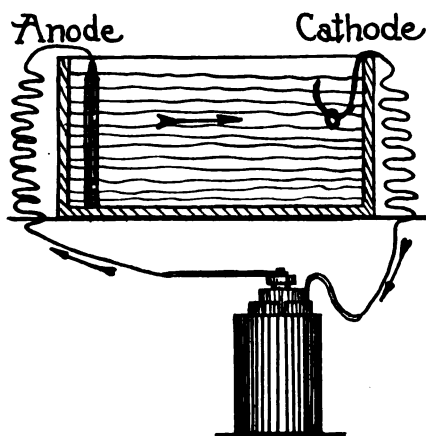


FIG. 3—DIAGRAM TO SHOW HOW ELECTROPLATING IS DONE

tiac, who used to go to the crossroads store closest to him, now jumps in his Ford automobile and buys his goods in Pontiac on Saturday afternoon and evening. It is a lark; a pleasant outing; it has an economic significance.

In the last decennial census, 677 towns in Michigan (27 of which were county-seats) lost in population. In New York, 746 towns (16 of which were county-seats) lost in population. In Pennsylvania, 1,520 towns (7 of which were county-seats) lost in population. We are building better roads, our farms are producing more, farmers are getting better prices for their produce, they are buying automobiles. California has one automobile to every 28 people; Nebraska, one for every 37; Iowa, one for every 50; Indiana, one for every 52. What's the lesson? Is it not that the trade is coming to the cities? We are feeding a hungry market now, but what

of the future? We must make some new discoveries in the retail shops. We have to discover the value of service from the customer's standpoint; because there are no people in the world who value service, individuality, quality, character, more than the American people.

I know some people afflicted with Bargomania will laugh at that! I will take you into Marshall Field's, Chicago; John Wanamaker's, Philadelphia; Altman's, New York; into Filene's, Boston (which last is one of the most conspicuous examples of a store that rose, rose and rose from a little specialty shop until today it is a great retail individuality)—these are stores of individuality; of character; rendering a human service to the man behind and to the man in front of their counters.

They are an asset to their communities.

Walk into your shop tomorrow morning at six o'clock. There is your stock on your shelves. There are your fixtures, your building, all the equipment. What is it producing? It is eating itself up. Every tick of the watch means that something in value is dropping away.

In two hours' time when everything is hustle, the men behind the anvils, on the floor and at the machines, have made the change. Now every tick of the watch is producing values. Those men can either accelerate or retard the deterioration which time exacts.

We have discovered the profit-makers of the shop! The great Stephenson said: "The greatest engineering in the world is the engineering of men."

The greatest stock of a business is its stock of heart, head and hands which it can call to its problems.

Some of our business men have not yet learned the bitter lesson that is to come to them unless they realize that the flesh and blood of their organization is the most precious thing with which they have to deal; that it makes or breaks business. It isn't stock—money can buy that. Hiring a shop boy is more important than getting an extra discount. Hiring a new helper is much more important than buying a piece of equipment.

Yet, you will probably investigate for thirty days the purchasing of a piece of equipment, and will take a helper on thirty minutes' notice.

Many business men fail because they don't know what a dollar can do; but more (by Dun and Bradstreet's) fail because they can not measure the real commercial power of their capital of ideas, experience, and ability to handle men.

So we discover that the real factor back of the business is not the stock but the person who handles the stock. In handling this stock, we need the enthusiasm of heart and brain; we need the discipline of faith and knowledge. Let me illustrate.

Mr. Edwin H. Wolf, General Manager of Schuman's, in Boston, said the other day to his people:

"There is but one thing to do, first, last and all the time. The thing to do always is to give the customer satisfaction. A true system is a convenience; it is made for the purpose of enabling many of us to co-operate to serve many others; it is flexible; it cannot possibly cover all cases; it must sometimes be broken; but when it is broken, the one who breaks it must repair immediately what he has done, and give his reasons for so doing. There is not a rule in this store that cannot be broken; but no rule must be broken by anyone who cannot successfully defend his action."

I never knew a rule which could live longer than six months without change. How often do you say—"It is a rule of this business; been so for five, ten, twenty years? Our business is successful—" Stop! Is it successful because of that rule? A rule that is old should always be open to suspicion.

Mr. Wolf said further:

"We need more insurgents. You remember the admiral in the Civil War who was told the harbor he was entering was protected by torpedoes: 'Damn the torpedoes! Go ahead!' was his command. That's the spirit! We want to make friends; we want to make sales; we want to serve our customers in the best way; and the only thing to do is to think out better methods. Let us not have too much respect for the old; but, let us not cast out the old until we are ready to substitute the better new."



Queries— Answers— Notes

Auxiliary Fire] Draught.—Here is a shop-kink that I would not want to do without. I drilled a hole in the top of my blower to take a half-inch pipe. I then removed a half brick from the chimney and bent the half-inch pipe so it went up into the chimney about two feet. This does not take any wind from the fire and it helps the smoke and soot to escape splendidly.

T. N. LEONARD, Pennsylvania.

A Formula for Thrush.—I will give you a formula for thrush, greasy heel and scratches which I have had excellent success with:

Sulphate of zinc, $\frac{1}{2}$ ounce.

Sugar of lead, $\frac{1}{2}$ ounce.

Pulverized alum, $\frac{1}{2}$ ounce.

Mix thoroughly with one quart of water.

W. E. THOMAS, Georgia.

A Bad Case.—I have a mule that is brought to my shop for treatment that has a bad case of contracted heel. The limb is stiff in the pastern joint and the foot pitches over on its toe. The animal can't set its heel on the ground. I am widening the heel. Will some brother please tell me through the journal what else to do for this animal so that it will set its heel on the ground? W. W. ABNEY, Alabama.

Thrush and Complication.—I have a mare under treatment that has had thrush, and now the muscles in the back of both feet (hind feet) are affected so she walks on the toe, and lies down considerably. She has been shod with a large toe calk on the front of the hind shoe. She is gentle and quiet, but the veterinarian cannot cure or even help her. I would be very glad to receive some information on the subject through the columns of the paper.

B. T. I., Utah.

Hardening Plow-Lays.—I wish you would kindly advise me, through the columns of the journal, the best way to harden plow-lays so as to prevent warping. Also where I can buy a torch or oven to heat them for hardening. ROBERT WERK, Nebraska.

In Reply.—Take 15 lbs. saltpeter, 2 lbs. rosin, 7 lbs. ferro-cyanide of potash, and mix well in a mortar. The lay is heated to a dull red and sprinkled with enough of the powder to make a sort of glaze, and then heated to the hardening temperature and cooled in water.

Plow-lays can be heated in the ordinary forge fire, but if you have enough work of this kind it will pay you to get a furnace.

F. M., New York.

Litharge and Glycerine.—I am about to put together an oxy-acetylene welding plant such as Mr. Waychoff described a

short time ago. He states that the pipes should be put together with litharge and glycerine. I would like to know if these two items should be of equal parts, then mixed together and put onto the threads.

FRED HENEKA, Michigan.

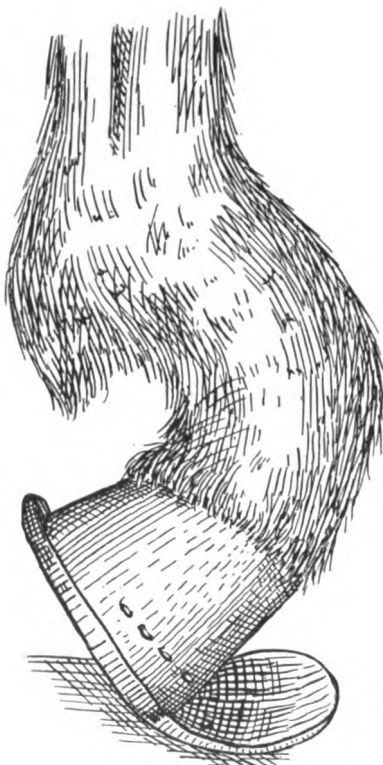
In Reply.—The mixing of litharge and glycerine is to secure a paste that is placed on the pipe threads to make it absolutely air-tight. White lead is often used for this same purpose. There is no definite relation between the litharge and glycerine. Simply mix the two until you have a thick, sticky paste to smear on the threads. Be sure and have every joint air-tight!

M. B. D., New York.

A Bad Case of Knuckling.—The accompanying engraving shows a case of knuckling which I recently shod, but haven't any hope of remedying the trouble very much; as it is of long standing and the limb has gotten stiff in the pastern joint. The foot is so contracted that the natural appearance is almost destroyed. Do you think that if I would clip the back tendons, it would benefit any? This being the first case of the kind in my experience I am puzzled as to just how to proceed. I shod the animal with a shoe as shown herewith and he seemed to go O. K.

W. E. THOMAS, Georgia.

Brazing Band-Saws—Gluing Emery Wheels.—I am quite a hand to make my own machinery. I have an attachment for my emery stand with which to sharpen discs, and can set it so that I can go about other work while it sharpens the disc. I use my power drill for a forge machine and



A BAD CASE OF KNUCKLING

for boring down wagon and buggy wheels. Have a 3 H.P. Olds Gas Engine, a band-saw, a heavy grindstone and a feed mill.

To braze the band-saw blades, I have a double burner torch. I bevel the blade one tooth and fasten them down to two blocks of wood. Then I turn the flame of the torch on and use granulated spelter and borax (cooked and powdered fine). When it

breaks afterward it is always in some other place than the new braze.

I have trouble putting emery on polishing wheels. I use common ribbon glue. I put the emery in a small trough, paint on glue mixed with vinegar (hot), then roll wheel in emery. In damp weather the glues softens and glazes till it is no good. I would like to know a good way to make it stay.

F. R. TOMLINSON, Kansas.

Mule Feet—That Poor Coal.—In reply to Mr. Callin's query on mule feet, I would say that I believe he has the right idea regarding the cause of the hardened condition of the mule's feet, although I have never worked in a mine. However, I would suggest as a remedy that he use crude oil and pack the feet in oakum well saturated with the oil, which will have a tendency to soften the feet. After the softening condition is obtained, the feet can be cut down far enough to locate the frog; when the feet will spread out rapidly. Undoubtedly the small frog is caused from contraction and, when the feet soften up so as to permit of spreading, the frog will commence to enlarge and resume its natural shape.

Now, I would like to say a word on poor coal as being full of sulphur. Mr. Benton says that it is there and there to stay and nothing will remedy it. However, I maintain that there is a remedy for this trouble, and would suggest that Mr. Sweet put a handful of table salt in the sulphurous coal, dampen well and coke it until most of the smoke has gotten out of it, and he will have no trouble in welding.

C. W. METCALF, California.

A Question of Inheritance.—Kindly give us information on the following: A man and wife who had real estate in Kansas whom we will call A had two sons and one daughter. One son whom we will call B, died, leaving a wife, son and daughter. Then A died. Then A's wife died, and a few days after A's wife died, B's daughter died—leaving a husband but no children. Now I want to know who will inherit B's share of A's estate? C. A., Michigan.

In Reply.—Too little data is given me for a case so complicated as this seems to be. You do not say whether any of these persons, especially A, left wills. That might change the situation entirely. If A left no will, the proper answer to your question is as follows:

Speaking under the laws of Kansas, in which State I assume these parties lived:—When A died, there were living—besides his wife—a son, a daughter, and a son and daughter of the other son, B, who had died before his father. B's share of A's estate would go to B's son and daughter, both of whom were living at A's death. This would rest in them at A's death, and the fact that B's daughter shortly after died, probably before her share could be paid to her, makes no difference. Her share goes to her heirs, of whom her husband seems to be the only one.

ELTON J. BUCKLEY.

A New Zealand Horseshoeing Price-List

The following price-list is that of the Waimate County Blacksmiths' Association of New Zealand. These prices for horse-shoeing went into effect on April first. The prices are originally given in English currency. The American equivalent is given after the English price.

	Per Set
Draught, with or without heels, up to 1 in. iron.	8s.0d. \$1.95
All shoes 1½ in. iron.	9s.6d. 2.31
Draught stallions in season.	12s.0d. 4.87
Draught stallions out of season.	12s.6d. 3.04
(Season to be from Sept. 1st to Jan. 31st)	
Hacks up to 13 in. x ¾ iron.	6s.0d. 1.46



	Per Set
Horses over 13 x 3/4 iron.....	7s.0d. \$1.70
Horses 12 x 1 iron.....	7s.0d. 1.70
Hack shoes of 3/4 iron.....	6s.0d. 1.46
Ponies.....	6s.0d. 1.46
All stallions other than draughts.....	10s.0d. 2.43
Hunters in fullered steel.....	8s.0d. 1.95
Steel training shoes.....	7s.0d. 1.70
Racing plates made and put on.....	10s.0d. 2.43
Racing plates, nailing on.....	5s.0d. 1.22
Stallion removes and slippers half the rate of new shoes	
Hack removes and slippers.....	4s.0d. .97
Draught removes and slippers.....	5s.0d. 1.22
Bar shoes.....	Each .61
Draught toes.....	6d. .12
Shoes steeled.....	3d. .06
All show shoes 4s. 6d. per set extra.	
Leather soles, hacks.....	1s.0d. .24
Leather soles, draughts.....	1s.0d. .30
Dressing feet from 2s. per set.....	

All time on one horse in excess of one hour to be charged for at the rate of four shillings (\$97) per hour for smith and helper; this to include stringhalt horses, young horses and all show shoeing, etc., stallions excepted.

Charge for smith alone, 2-6 (\$.61) per hour; helper alone, 1-6 (\$.36) per hour.

All work on horses not herein specified to be charged for at the foregoing time rates.

N. B.—In cases of doubt, make your charge and report to Association for adjustment.

A Good Side-Line for Repair Shops

Nearly all repair shops at some time are looking for a good side-line to manufacture during dull seasons; but in the beginning of most industries some protection is necessary. As the raw materials usually weigh more than the finished product, and the large, well-equipped factories enjoy the best locations, with transportation advantages as well as the fine equipment, in most cases; the infant industry finds it very difficult to get started. It is believed that, in the manufacturing of the dry battery along the following outlines, these difficulties may be largely eliminated.

During recent years, there has been sought some efficient means by which dry cells might be renewed. A large number of methods have been tried and many have not proved satisfactory. As one of the principal active materials in dry cells is sal-ammoniac, which becomes exhausted after a time, this sal-ammoniac must be replaced when it is desired to renew the exhausted cell.

A dry cell made up of standard materials and of a design which may easily be constructed by the general repairman, a cell that can be renewed, should answer a felt want. After considerable time spent upon experiments such a cell has been produced. The dry cell considered here differs from the standard form of dry cell, in that the carbon and zinc elements are placed in a retaining cup; the depolarizing mixture being placed between them.

Old fruit cans, oyster cans, condensed milk cans, etc., may be used, by a cheap and simple treatment, for the retaining cups. Shopmen may create a large local trade; using these tin cans thrown out of the kitchens for retaining cups. When manufacturing for an extended market, it would become necessary to use a standard size retaining cup.

The zinc element is of special construction; giving a large active area which makes low internal resistance and great current strength. Very much less zinc is required, as it is arranged so it may practically be all used up. They may be renewed by any of the common methods. Further, when the zinc is worn out, the materials may be dumped out and worked over into a new cell.

Some few jars and other vessels are required for holding materials. The simple tools can be made by the shopman. This,

together with the advantage of renewal of the dry cells, should render this an interesting proposition to ambitious mechanics.
A. C. GOUGH.



The Automobile Repairman

After snapping the rings into their grooves on the piston, wrap a string tightly around the ring first to enter the cylinder and draw it down until the ring diameter is only as great or less than the piston diameter and tie it firmly. Then slip the string to the edge of the ring farthest from the cylinder entry; slip the piston in until the inner edge of the ring has entered the cylinder; then cut the string and remove it. All the rings may be strung up thus before starting the piston into the cylinder, and the work of inserting them with the piston and cutting the strings in rapid succession will be easy.

Vulcanizing: the How, the Why and the Wherefore*—2

E. V. S.

Inner Tubes

We will first discuss the repairing of tubes. In a tube puncture, clean the tube thoroughly with gasoline and coarse sandpaper for at least an inch all around the hole; being careful not to get any gasoline inside of the tube; then wipe with a cloth moistened with gasoline. When the gasoline has evaporated, cement the edges of the hole and apply a thin layer of cement to the tube for 3/4 of an inch on each side of the hole. Let the cement dry until the gasoline has all evaporated and the cement is "tacky," as it is called. If a small hole (see A in Fig. 3), fill to the surface of tube with layers of Para rubber (uncured rubber), cut the size of the hole; taking care that the Para sticks all around the edges.

* Photographs by courtesy of Shaler Co., Wau-pun, Wis.

If just a simple puncture, place a narrow strip of Para over the end of a match and insert it into the hole; cutting off what protrudes outside the tube. Cut a patch of Para 1/8 inch larger than the hole or puncture and apply over same; then cut another patch 1/2 inch larger than the hole and apply over the first; covering with wax paper large enough to keep it from contact with the heater. Lay repair on tube plate, repair down, and clamp in place; using a block that will entirely cover the repair. Be careful not to pinch edges of tube and do not use a wrench to tighten the clamps. Repairs of this kind are to be vulcanized for fifteen or twenty minutes at 265°.

In larger cuts or tears (as at B in Fig. 3), clean as directed both inside and outside of tube; coat edges of cut and inside and outside of tube with cement, and let dry. The cement should extend 3/4 inch back from the cut. Cut a strip of Para rubber as wide as tube is thick, and stick on edge of cut; cut a strip, 1/2 inch wide, of the rubber, cured

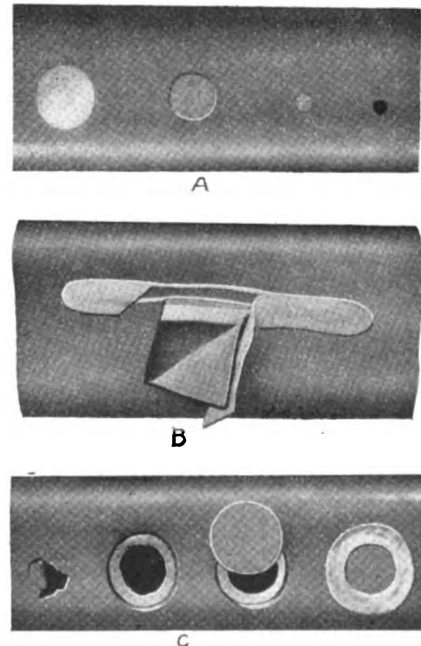


FIG. 3—THE TUBE MUST BE THOROUGHLY CLEANED AT THE POINT OF PUNCTURE

on one side; place it inside of tube under tear with cured side down; bring edges of tear together and stick them down to this strip. If you do not have any of the Para cured on one side, regular Para may be used after cementing a piece of paper to



inside of tube opposite cut to prevent patch from sticking to opposite side. Apply another strip of Para rubber, $\frac{1}{2}$ inch wide, on the outside of the repair.

Cover the repair with wax paper, and vulcanize for about twenty-five minutes.

Sometimes it may happen that the repair is larger than any plate on the vulcanizer. In this case the repair is placed so that the vulcanizer overlaps the cured part at one end, $\frac{1}{4}$ inch. Then at the other end, where the repair extends out of the vulcanizer, a piece of paper or other non-conducting material is placed a little ways under the repair so that that part will be only half cured at the first setting and will not be over-cured during the second operation.

In mending large, irregular bursts or blowouts in which a piece of rubber has been blown out of the tube (as illustrated at C in Fig. 3), the best method is to trim down to a clean, solid surface; making the hole somewhat regular in shape. The hole may be filled with layers of Para rubber, cut to fit, or by cutting a piece of old tube corresponding in shape and strength and vulcanizing it into place in the manner described in mending long cuts or tears. Care must be taken not to use enough repair material to force tube out of shape and leave it distended and bulging.

It often happens that when a tube is badly torn it is easier to cut out a section and replace it with a new piece of tube; in other words, "splicing" the tube (as at A in Fig. 4). In making repairs of this kind be careful not to alter the original length of the tube. Clean the outside of one end of the tube for about 4 inches; fold back the other end, turning the tube inside out, and clean for the same distance; applying at least three coats of cement to each end; allowing each to dry thoroughly before applying the next. A repair of this sort requires a considerable amount of cement if no Para rubber is used, because the adhesiveness of the joint depends upon the cement alone. A narrow strip of Para between the two tubes will add to the strength of the joint. The open end is brought against the folded end and the latter telescoped over. Care must be exercised in making the

joint uniform to avoid stretching any part of the tube. It is then vulcanized in three operations—the first of twenty minutes' duration; the last two, fifteen minutes each. A block should be used (as shown at B in Fig. 4), to prevent pinching the ends of the tube.

The valve seat in the tire receives hard usage and is very often badly in need of repair. The seat for a metal valve stem is made as follows (C in Fig. 4). Select a good place on the tube, clean a space about 4 by $2\frac{1}{2}$ inches and cut a hole about $\frac{1}{4}$ inch in diameter. Remove the nut from the valve stem and stretch hole in tube over the base of the valve stem. Push the stem clear through into the tube. It is to be

ber, $\frac{1}{4}$ inch larger all around than the first. This is vulcanized forty minutes. Then shake the valve stem on inside of tube to the vicinity of the hole and force it through the opening until the base rests against the inside of the tube. Screw down nut on the outside and it is ready for use.

Repairing Casings

We will now consider the repairing of casings. The first step in making a casing repair is the same as in all tire-work—to thoroughly clean the point of repair. Apply from one to three layers of cement; allowing each to dry. If the canvas is exposed, as in a scalp cut, put on enough cement to fill the pores of the canvas and leave a smooth surface when dry. Fill the hole, not quite level with surface, with Para rubber. The best results are obtained when casing repairs are slightly concave. If filled too full, the rubber will expand and flow over onto the unprepared surface in a thin film that will soon peel up and cause trouble. Moreover, a protruding patch will receive more than its share of hammering on the road and will undoubtedly split open. Cover the repair with waxed paper and hang the tire loosely on inside casing form. This form is shaped like that of the interior of a tire and fits into it. Then clamp the outside casing form (see Fig. 2) over repair, and vulcanize from thirty to forty minutes, according to the depth of the repair.

In repairing sand blisters, take a sharp knife and cut half way around the blister; cutting through the rubber to the canvas and leaving the rubber attached on the side nearest the tread of the tire (as shown at the left at D in Fig. 4). Turn this flap back and remove all dirt; then clean and cement as for casing cuts. Cut a strip of Para rubber, as wide as the rubber on the tire is thick, and stick on the edge of cut; then cut a thin sheet of Para the exact size of the canvas (as seen in the center at D, Fig. 4). Lay the detached flap back in place and stick it down tightly; taking care to stop the hole where the dirt entered to form this blister. It may be as much as a foot away from the latter. Vulcanize as above instructed for small cuts.

(To be continued)

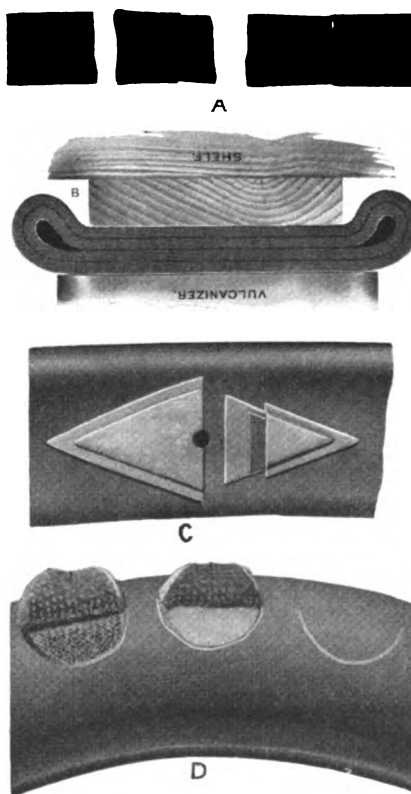
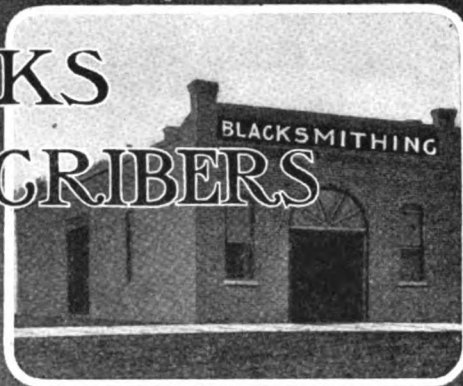


FIG. 4—VARIOUS OPERATIONS IN THE REPAIR OF TUBES AND A CASING

kept inside and away from the repair until after vulcanization. Cement the entire clean surface around the hole in the usual manner. Cut an oval or diamond-shaped piece of Para about 2 or 3 inches. Cut a hole in center to correspond with hole in the tube. Roll it down on tube so that both holes are even. Cover with a layer of blowout canvas of same size and shape. Cover all with another layer of Para rub-



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Association Work.

THE AMERICAN BLACKSMITH has always favored the formation of associations, and has always been ready to assist in the building up and strengthening of smithing organizations; and it is with a great deal of satisfaction that we view the efforts of a number of organizations to back up the work we have been doing in the way of improving smithing business methods. A number of associations have had discussions on cost-keeping and accounting methods at their meetings. Several organizations have had some local business expert address them on the subject of bookkeeping and similar subjects; and all of this shows the craft is on the right track. The smith of yesterday cannot advance unless he adopts the business methods of today. He cannot improve his condition and that of his craft without adopting modern business methods. And when he does adopt them he will get better prices; an assured profit; and a general betterment of craft and business conditions will naturally result.

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Will You Write a Letter?

We want you to write a letter to us. We want you to tell us frankly and honestly just what you think of "Our Journal." Tell us what you don't like about it—if there is anything you do not like. Rip right into us if you think there is anything in the paper that shouldn't be there. Throw a brick or two—bouquets are fine and we like them, but an occasional kick with a brick or two for good measure keeps us going right. So, let us hear from you with a good stiff criticism.

Read Before You Sign.

Mr. Buckley in this issue speaks of what he calls "a little joker," and which appears in about every contract made these days. If you have ever signed a contract or paper of any kind without reading it, and have in consequence contracted for something you didn't intend nor expect to do, you'll not need to be reminded "to read before you sign"; but in any event, Mr. Buckley's article will interest you; and if you are inclined to be careless about signing contracts, read about "The little joker," and then be sure to "read the contract carefully before you sign it."

Don't Forget the Advertising Pages.

Mr. F. H. Shupe, a Pennsylvania reader, reminds one of a feature of "Our Journal" that we are sometimes inclined to overlook. He refers to the advertisements. He says:

"Each issue contains information of value and profit to me, even to the advertisements which I appreciate. I consider it a very good policy for a business man to take his trade paper, in order to keep well posted on the progress of his trade."

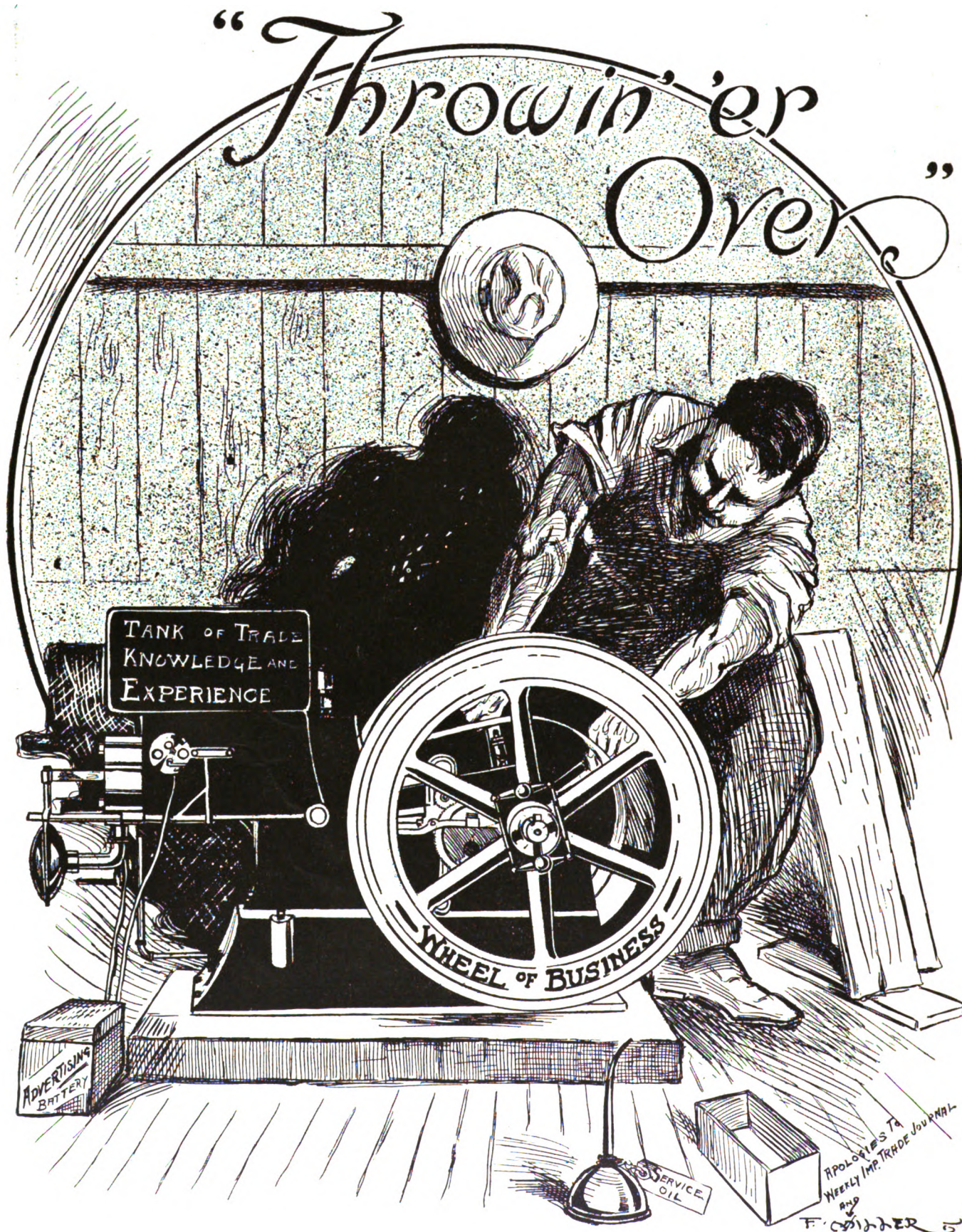
And if a man doesn't read the advertisements how can he keep posted on his trade? How can he expect to keep abreast of the times? How can he know what new tools and machines are being placed on the market? If a smith does not subscribe to and read a trade journal how can he know that certain labor-saving and time-saving tools are made? Ask your neighbor.

Horse Shoe Competition

The Roads Improvement Association of England, under whose auspices the horseshoe competition (announced in these pages some months ago) is being held, reports as follows:

"Over 850 shoes were received from various parts of the world, all of which were thoroughly and individually examined by the judges. Five sets were chosen and are now being tested on the different road surfaces in Leeds, Birmingham, Sheffield and London. This has necessarily taken some time and the judges have not yet come to a decision."

As soon as a decision is made in the above competition, announcement will be made in these columns.



IT'S NOT A SELF-STARTER

But after the first good shove over and a good supply of fuel in the tank, with an occasional renewal of the battery and good liberal use of lubricating oil to keep 'er goin' smooth, she'll keep a-goin' right



A Wheel-Building Machine, Combining Several Labor-Saving Features

A. C. GOUGH, M. E.

THE work of removing the wheel from the wheel bench to the boring machine and then again to the wheel bench for putting on the felloes always seemed worse than useless. In fact, though the shop equipment where the writer spent several years included a boring and tenoning machine, many jobs were completed with the hand tools rather than move the wheel back and forth. This was several years ago, however, and the following design is the first attempt to produce a machine combining the wheel bench, spoke driver, boring and tenoning machine.

It is rather difficult to adapt a design for a machine as heavy as this to be built in the general repair shop, and the details of any design are not usually perfected by the first attempt, but it is believed that the idea here illustrated is one of great importance to the wood-working department. Where combined machines are especially desirable, a band saw, jointer, mortiser, felloe rounder, etc., may be included as part of this wheel-building machine.

Operation: Select a bushing, 1, that fits the hub or wheel, 2 (see Fig. 1). Next, place the wheel or hub in the position shown, and put the cone-shaped bushing, 3, in place; the rod, 4, may then be put in position. The rod, 4, has a shoulder by means of which with the hand wheel, 5, the wheel or hub is clamped solidly upon the frame, 6. This operation clamps the sliding parts, 7 and 8, at the same time. The wheel or hub may be adjusted to proper height by thin wood or metal parts, 9. The pieces, 9, are slotted to allow them to be slipped in place under the wheel. When driving the spokes it is necessary to secure the top end of rod, 4. This may be done in the following manner: Screw the hand wheel, 10, downward, which clamps the parts, 12 and 13, solidly to the beam, 14. The position of the wheel may be adjusted easily as shown.

The driving gauge may be clamped to the beam, 14, in a similar manner. Screw the hand wheel, 15, down, which clamps the parts, 16 and 17, in desired position. The gauge may be

raised or lowered by means of the hand wheel, 18, which screws upon the rod, 19. The rod, 19, may be secured by means of hand wheel, 20. The spoke, 21 (see Fig. 5), may be held securely in position against the shoulder, 22, by the part 23. The lever, 24, hinges upon the pin, 25, and may be raised to a vertical position, which allows the wheel to be turned and another spoke placed in position for driving.

The ram may be constructed of a piece of wrought-iron pipe, 26, with a die of tool steel, 27, secured in the end by a pin or otherwise. The part, 26, slides in the bearings supported by the standards, 28 and 29. The part, 30, may be easily constructed to be adjusted upon part, 26, when desired. The helve, or beam, consists of two parallel bars, 31, which hinge upon the pin, 32. The springs, 33 and 34, may be trace springs or any suitable open coil springs. The heavy pulley at 36 should be keyed upon the crankshaft. The spoke driver is run by a belt from the pulley, 37, running in the direction of

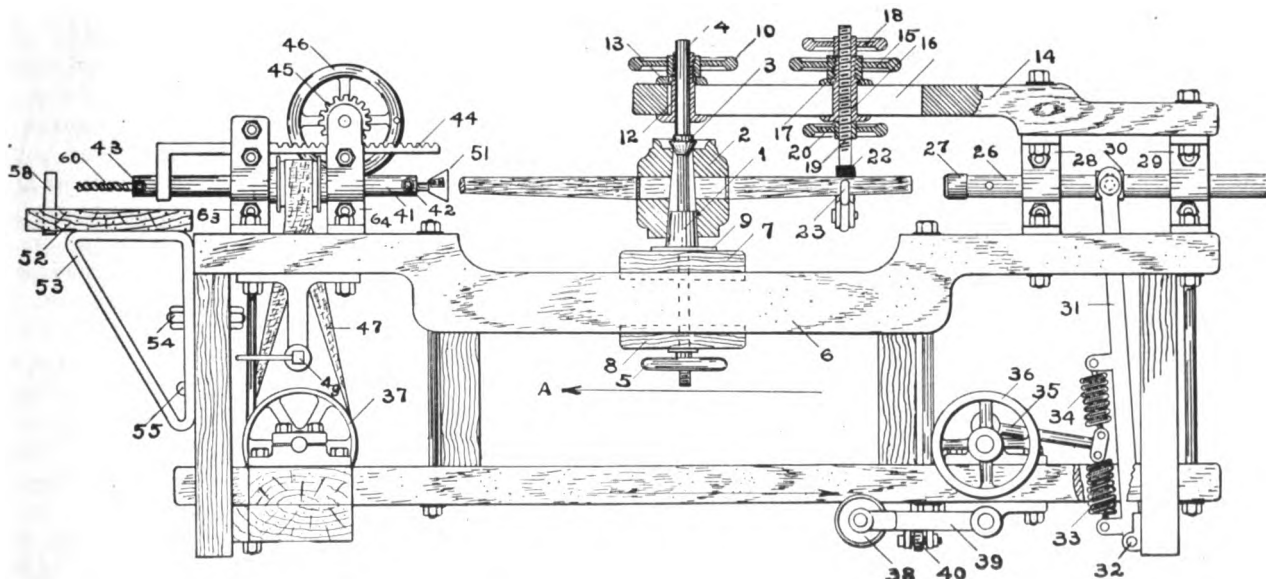


FIG. 1—A PRACTICAL WHEEL-BUILDING MACHINE THAT COMBINES SEVERAL LABOR-SAVING FEATURES



the arrow A (Fig. 1). This belt runs slack when idle and may be tightened by the idler pulley, 38, carried by the arm, 39. The idler pulley, 38, may be raised and lowered by the lever, 40. The pulley, 38, and parts are to be heavy enough to hold the lever, 40, in a raised position, so that it is only necessary to press with the foot upon the lever, 40, to put the driver in action.

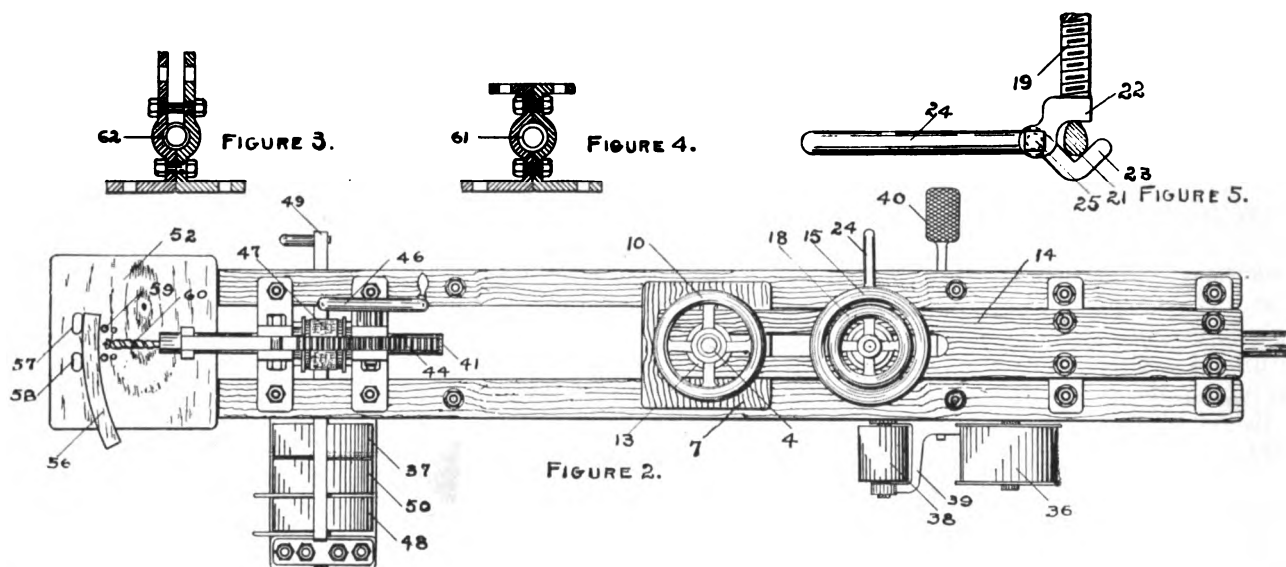
The shaft, 41, may have sockets in each end, as shown, for holding augers, arbors, etc. If the shaft is made extra large, the set screws, 42 and 43, may have the heads sunk; in case combinations are added, the shaft, 41, should be heavy. The tools may be moved to or from the work

When desired, a supplemental table, 52, may be added for various uses. This table may be supported in the manner shown by the parts 53, 54 and 55, which provide for vertical adjustments. This avoids the inconvenience of moving the wheel out of the way when boring the felloes. The felloes may be placed in position for boring the holes for the spoke tenons as shown by 56. The standards, 57 and 58, receive the pressure, while smaller adjustable standards, 59, will prevent the felloe following the auger, 60, when it is being withdrawn.

Nearly all of the parts may be forged. Fig. 4 shows the principle of the standards, 28 and 29, and Fig.

been developed through several years' experience and has proven very satisfactory

When a nut is screwed upon a bolt or axle clip, any extra extension beyond the nut should be sheared off with the bolt clipper. But, when replacing nuts upon bolts or axle clips, the effect of shearing off the end often renders it difficult to get the nut "to start." Of course, the burr upon the thread may be removed with a file, and I worked in a shop several years where this method was practiced until die stocks were purchased which could be used in the common bit brace. However, this method proved to be sometimes inconvenient, so these dies were finally removed from



A TOP VIEW OF THE WHEEL MACHINE, ALSO DETAILS OF SOME OF ITS PARTS

by means of the rack, 44, which is operated by means of the pinion gear, 45, and the hand wheel, 46. The shaft, 41, is driven by means of the flange pulley and belt, 47. The main countershaft is driven by a belt which runs upon the pulley, 48. When the machine is not in use, the drive belt (not shown) may be shifted by the belt shifter, 49, to the loose pulley, 50. Where there is objection to having the shaft, 41, run idle when the driver is in use, provision may be made for a clutch or another shifter that will control this.

An arbor which carries a small, special circular saw may be secured in the socket end of the shaft, 41, for the purpose of cutting off the spokes to correct uniform length. The spoke pointer, 51, is shown in place, but may easily be removed for the tenon auger.

3 shows a detail of standards, 63 and 64. The parts, 61 and 62, may be either solid or split bushings.

The shaft, 41, should not be less than $1\frac{1}{4}$ inches in diameter; the spoke-driver ram should weigh about 25 pounds, and the timber out of which the frame is constructed should be about 4 inches thick and very solid.

Some Small Tools for Carriage Work

A. C. GOUGH, M. E.

Should one possess all of the small tools described in the various journals and catalogs, the tool room would indeed need to be very large. Almost all carriage workmen have a just pride in providing a neat set of tools for taking down or assembling carriage parts. The following set has

the original stocks and mounted in a stock of the form shown at Fig. 1 (opposite page.)

The form of die holder shown, possesses, perhaps, the greatest convenience for work of this class, combined with a neat appearance. The design and construction may be varied to suit the equipment at hand for the work; but as shown here it may be constructed as follows: The parts, A, may be turned out of machinery steel to fit the dies, B, and the end threaded to fit the wrought-iron pipe fitting, C. The cross may be a $\frac{3}{8}$ -inch pipe fitting for the small size, to be used for light carriage work, and the dies may range in size from $\frac{1}{16}$ to $\frac{3}{8}$ inch. For heavy carriage and wagon work, the cross may be a $\frac{1}{2}$ -inch pipe fitting, and the dies may range from $\frac{1}{16}$ to $\frac{5}{8}$ inch.

There are a number of splendid



adjustable dies upon the market suitable for use in this stock; however, the mechanic may make this set of dies for himself. Solid dies of standard sizes answer very well for the purpose of cleaning out a battered thread, and may be made as follows:

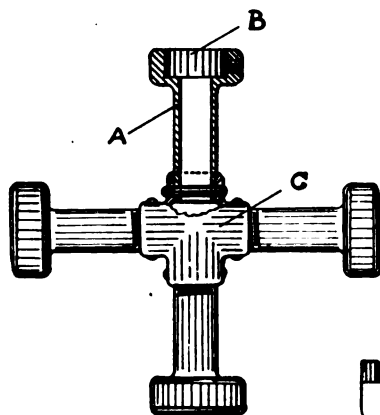


FIGURE 1

SOME SMALL TOOLS THAT WILL PROVE HANDY FOR THE CARRIAGE MAN

of tools. The wrench shown by Fig. 3, combines the common open-end wrench and clip tong. As may readily be seen, one end of the wrench may be used for starting the yoke upon the end of the clip, also as a closed wrench.

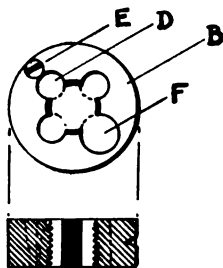


FIGURE 2

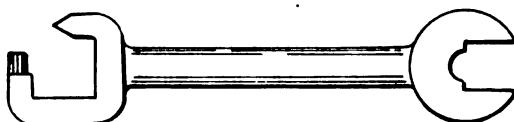


FIGURE 3

A piece of tool steel, long enough to make several dies (the diameter being large enough for turning up the largest dies), after being carefully annealed, may be secured in the lathe chuck ready to be machined. After finding the center for the drill, the piece may be bored true for the smallest size die. Next, threads of proper size and depth may be cut for the smallest die, the outside turned and the die cut off the end of the stock with the cut-off tool. By beginning with the smallest die first, the stock is left in form and size for the next largest size. After the die is threaded in the lathe, it may be further reduced to an exact standard by passing a standard machine tap through it. The cutting edges may be produced by drilling four holes as indicated by dotted circles, D, Fig. 2. Before drilling the holes, D, the die should be plugged by a piece of annealed tool steel threaded to fit the die snugly. If an adjustable die is required, one of the holes should be drilled somewhat larger, as at F, and provision made for a taper screw as shown at E.

No doubt the number of wrenches designed far exceed that of any of the other small tools, but here is another one to accompany this set

For several years we used the bolt clippers, and they cannot be beaten; but after making a tool designed for a "nut splitter," we found that it answered practically as well for clipping the ends of bolts; and the inconvenience of carrying two tools caused the one shown in Fig. 4 to be finally adopted. This tool for splitting nuts and clipping the bolts may be constructed as follows: The parts, C and D, should be forged from tool steel. For light and medium work,

may be provided, as shown at A, and a thumb screw, as shown at B, will render this adjustment easy to make.

A Little Joker: Making Contracts out of No Contracts

I want to say something in this article about a little joker which is coming to be used in all contracts between business men, particularly those printed contracts which are submitted to merchants to sign in connection with various enterprises like the sale of certain appliances such as cash registers, fixtures, scales, and everything else of the sort. And not only in such contracts as these is the provision I refer to being inserted, but in almost all other business contracts of whatever nature.

I copy the following from a cutting machine installment contract. It will be found to appear in substantially the same form in all other modern contracts for general business purposes:—

This contract covers all agreements between the parties hereto, and all claims for verbal agreements of any nature not embodied herein are waived. Agents of the _____ Co. are not authorized to make any agreements or verbal promises not included in this contract.

During the month of January last, a business man was being solicited by a salesman for an order for certain appliances of the labor-saving type. They ran into several hundred dollars. Finally the salesman made him this proposition: "All right, don't give me any order. Just let me put a couple

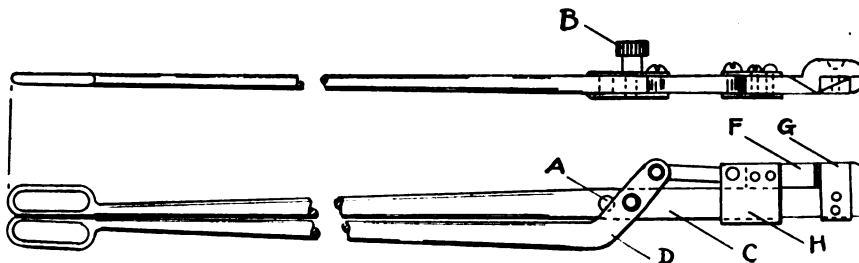


FIGURE 4

A PRACTICAL NUT SPLITTER AND BOLT CUTTER COMBINED

the larger part, C, should have the dimensions of $\frac{1}{2}$ by 1 inch. The part, H, may be formed of machinery steel. The cutters, F and G, should, of course, be made of good tool steel carefully hardened and tempered. To adjust this tool for splitting nuts of various sizes, a number of holes

of my machines in for one month. If you like them so well you want to buy them, all well and good—the price will be so much. If you find, after trying them, that you don't want them, we'll take them out again and no harm done. Not a cent of expense to you anywhere."



"That seems fair enough," said the man, "what do you think of it?" turning to two employees who had heard every word the salesman said. They saw no risk in it, and the salesman agreed to deliver the machines the following day, which he did. Before he concluded that interview, however, he asked the merchant to sign a printed paper as a memorandum of the transaction. This the merchant did without reading it.

Later—within the month—the company manufacturing these machines asked the merchant to pay for the two machines. He refused and stated how the machines came to be put in. The manufacturer then sent him a copy of the paper he had signed,

court and the merchant went confidently in with the two men who had heard it to show how the whole thing happened. He could not understand how the court could possibly give judgment against him when he testified to the real arrangement as made between him and the salesman in the presence of witnesses. He was amazed when the judge refused to let either him or his two witnesses testify to that at all. The machine company's lawyer objected to that testimony being admitted on the ground that all verbal agreements or understandings were merged in the written paper, and that the written paper, in so many words, clearly provided that they should be. The

pay about \$400 for machines that he has clearly demonstrated, by trying them, that he does not want and never had any intention of buying. Never to his dying day can that man be convinced, I will wager, that he has not been a victim of a grievous outrage. Of course the answer is that he should have read the paper before signing it, but I am not considering that phase of the subject now.

As a matter of fact I have many times seen this little clause rise up to plague even a man who did read the written paper before he signed it, but who did not appreciate the significance of this clause. He would later disagree with the other party to the contract, and when the matter

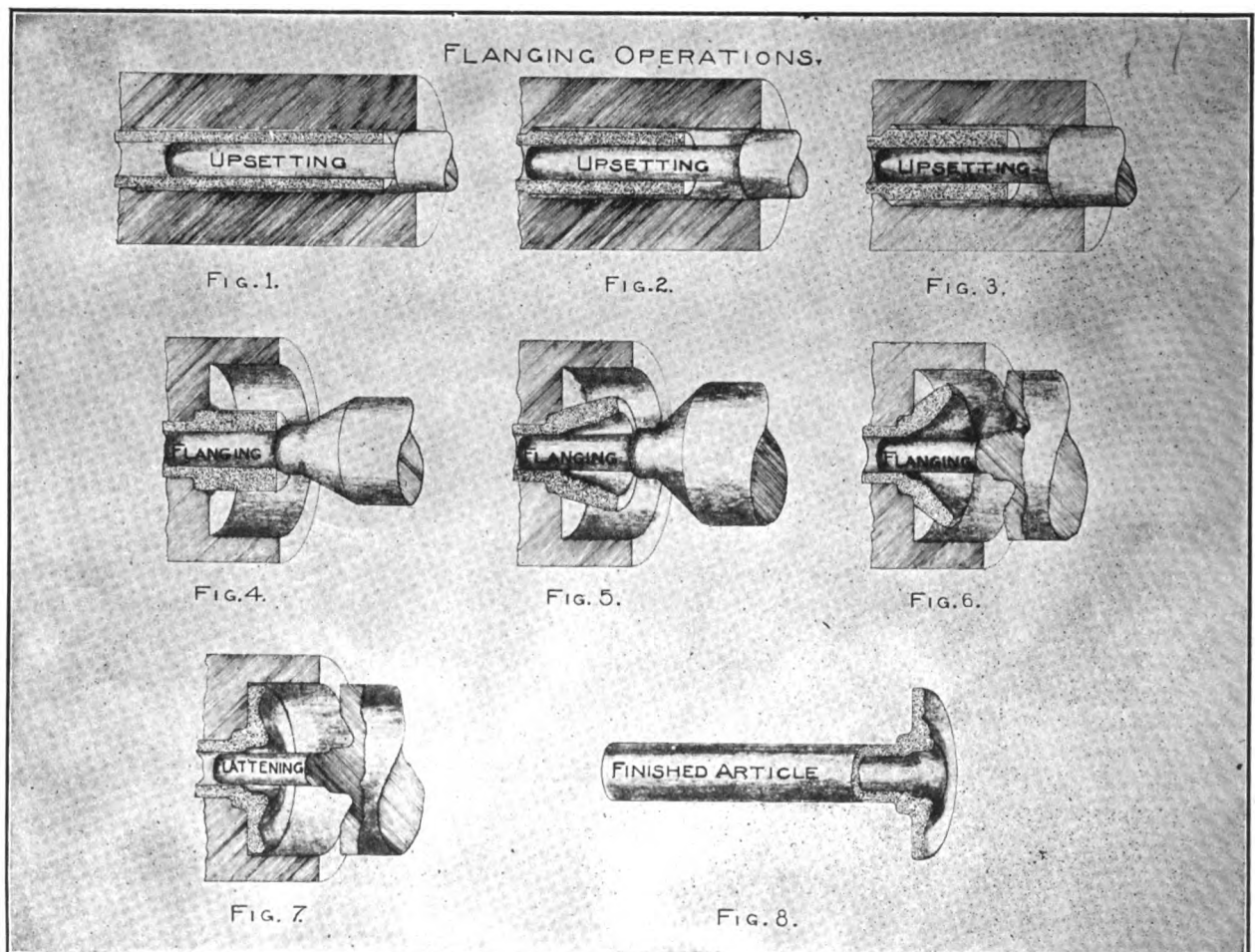


FIG. A—SHOWING THE VARIOUS OPERATIONS NECESSARY IN THE FORMATION OF A FLANGE ON A TUBE END

which proved to be a contract of purchase, containing a clause like the above, the substance of which in law amounts to this: "I certify that the only arrangement existing between us is fully contained in this writing."

This case got before the lower

judge sustained the point, as judges always would do, because the law is clear on the subject, and the merchant stood shorn of his defense and bitterly arrayed against courts and the law for the rest of his life. What is more important, from a practical standpoint, is that he will have to

got into court would attempt to show that the contract was changed by some verbal understanding before signing it; or that the other party told him before he signed it that he would not enforce some part of it, and so on. The courts always decide this point the same way, viz., that



all verbal talks and understandings between two people who subsequently execute a writing are merged in that writing and disappear. The writing takes their place and constitutes the entire contract. This is really a salutary rule, though often a hardship on a careless business man. Without some such rule, it would almost always be impossible to tell what a contract was. Each party would tell a different story as to what he understood and what the contract meant, and there would at once be confusion worse confounded.

There is an easy way to escape all trouble from this source, and that is to make every phase of the understanding between yourself and a man with whom you are making a contract on any subject, a part of the *written* agreement. This is especially important as to features of the contract which are either contradictory of the written agreement, or which are not mentioned at all in the written agreement. Don't take anybody's word that something on which you are relying doesn't need to be written in. Insist that it goes in every part, and written clearly and distinctly. This applies particularly to the sort of talk that precedes the making of most contracts, which can be described as "promises" and "reassurances." It is on those that written contracts usually split apart.

(Copyright by Elton J. Buckley)

Seamless Tubes and Cylinders

Seamless tubing, tubes and cylinders, are used in one form or another in practically every branch of manufacturing, from automobiles to washing machines, and because of the great variety of uses to which the seamless shapes are put, it is extremely interesting to see just how the various articles are formed. The accompanying engravings show the operations in forming a few articles and also show how seamless tubes and cylinders are made from plates. A few specimens of hydraulic forgings produced from the solid billet are also shown in process of formation.

In Fig. A is shown how a seamless tube is upset, expanded and flanged. Figs. 1, 2 and 3 show how the tube is upset. At Fig. 4 the flanging starts, and it proceeds gradually until in Fig. 7 the flattening is done where the

metal is spread out, making the finished article.

In the engraving (Fig. B) is shown the formation of a ball axle tube. This specimen shows not only the forging of a ball on the end of a tube, but the tapering of the tube beside. Figs. 1 and 2 in the illustrations show the upsetting operation of the ball end of the tube. The ball on the end of this tube is to be of larger diameter than the tube itself, and therefore the original tube must be upset or thickened in the walls, so that in the operations following, this end can be

part of the die is working rapidly through the action of the steam hammer.

When long tubes are tapered, two or more sets of swaging dies are employed; set of dies always overlapping the other in the work, so as to prevent any breaks in the true taper of the tube.

In Fig. C (next page) are shown the operations necessary in the forming of a flanged and tapered rear axle for an automobile.

In Fig. D is shown a machine that has lately been introduced into the

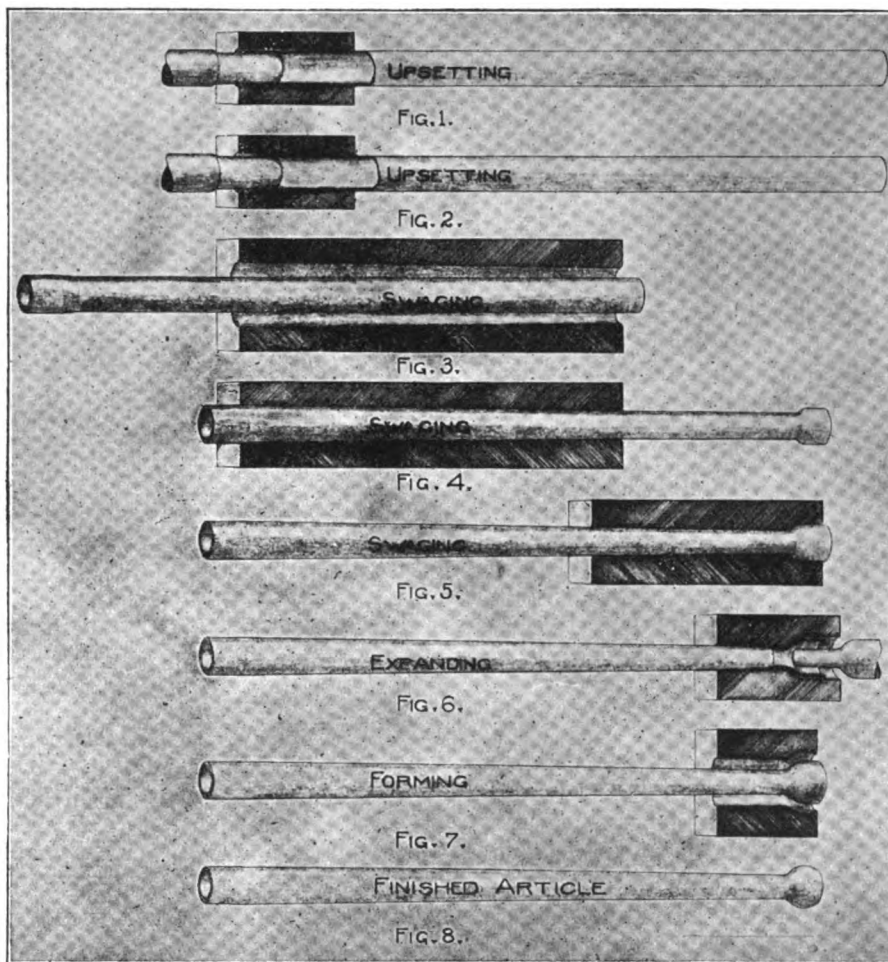


FIG. B—HOW A BALL AXLE TUBE IS FORMED FROM SEAMLESS STOCK

expanded to its required diameter and still retain the same thickness of wall as the original tube. Figs. 3, 4 and 5 show the swaging or tapering operations which are accomplished by a steam hammer; the anvil of this hammer being one half the swaging die, and the hammer proper the other half. The tapering operation consists simply of feeding the tube in through this die, at the same time turning it, while the upper

seamless tube industry. This is a spinning machine. The idea of spinning metal is old, but the adoption of the spinning process in the seamless tube industry is new.

In this machine, the open end of a tube can be closed by spinning, and also perfectly welded in the same operation. The process is very simple. The machine itself is a sort of lathe with a hollow spindle provided with a chuck for holding the tubes to be



spun. Before the tube is put in the spinning machine, the end to be spun is slightly heated. The spindle is then rotated at a speed of from 1,200 to 1,400 r. p. m. with the tube. At that speed a blunt tool of self-hardening steel is brought to bear against the tube and swung around the end of it. Little by little the tool is brought forward at each sweep around the end; causing the tube to close up into a half-spherical form. The fric-

the metal has been dragged down to the center, but not yet closed; the outside metal of the tube has dragged ahead and formed a button-like protuberance. In Fig. 4, this protuberance has begun to close up, and in Fig. 5, when the heat, in the judgment of the operator, is sufficient for welding, the tool is swept across the end of the tube; cutting off this protuberance, and the welding of the center is performed; resulting in a closed tube

cup through dies or rings of proper dimensions. Figs. 3 and 5 illustrate the elongation or hot-drawing operations, where the cup produced in Figs. 1 and 2 is, by successive operations, elongated or drawn by pushing it through a series of dies or rings, each of these rings being a trifle smaller than the previous one through which the tube passes. Thus the hot-drawn shell, illustrated in Fig. 6, is produced. All these operations

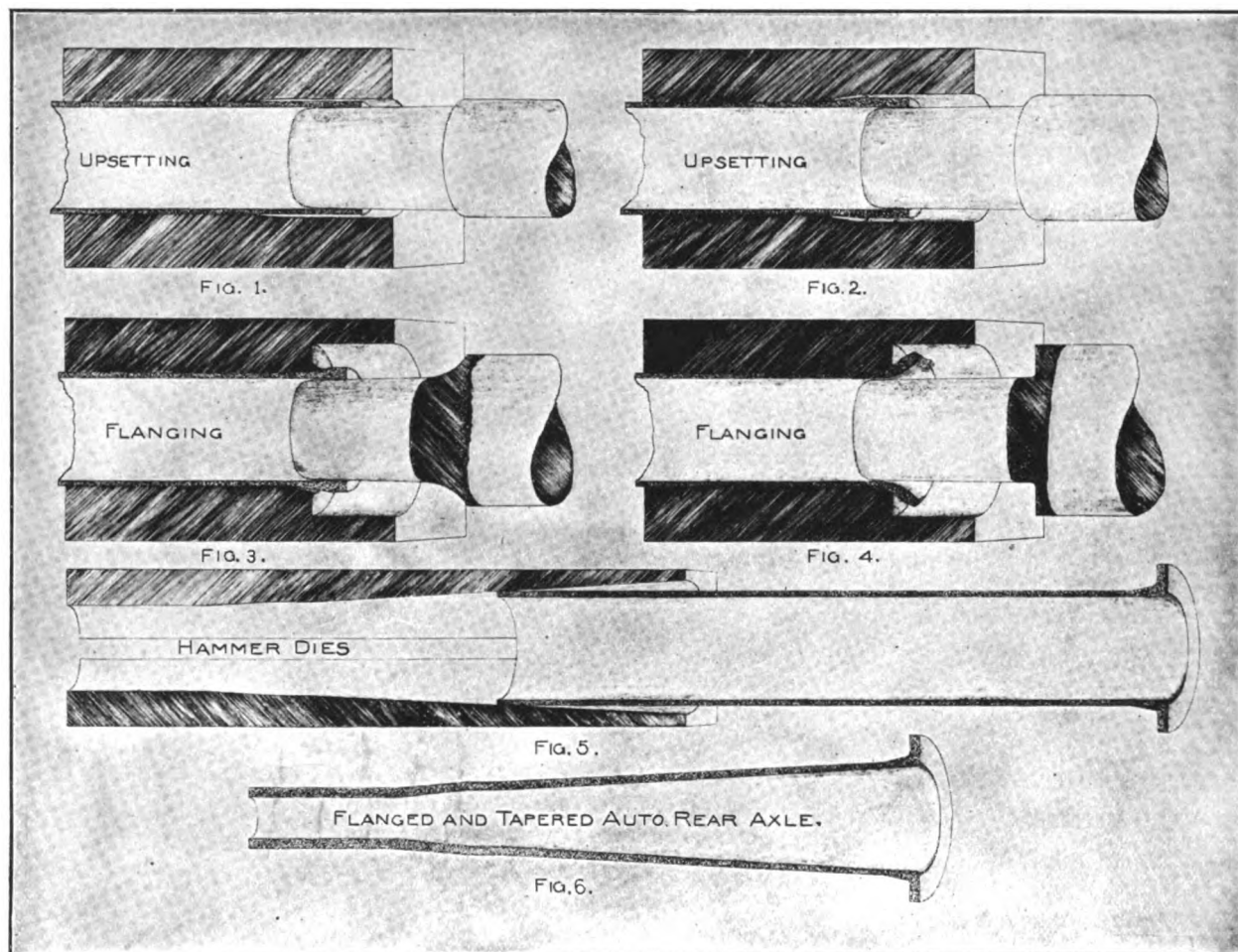


FIG. C—HERE ARE SHOWN THE OPERATIONS NECESSARY IN THE FORMATION OF AN AUTOMOBILE REAR AXLE

tion of this tool against the tube creates a high heat, and as the metal is gathered closer and closer towards the center, the heat at the center becomes so intense as to melt and close the opening with a perfect weld.

At Fig. E are shown the different stages through which a spun end of a tube passes in this closing and welding operation. Fig. 0 is the straight open end of the tube. Figs. 1 and 2 indicate how the metal flows during this spinning operation; they show how it thickens up as the diameter diminishes. Finally, in Fig. 3,

end as shown in Fig. 6. This whole operation does not occupy more than 20 seconds. The power required to close a tube 6 inches in diameter by $\frac{1}{4}$ -inch wall is about 40 H. P.

In Fig. F (page 270) is shown the evolution of a steel disk from plate to seamless cylinder. In this illustration are shown all the operations in the manufacture of compressed air and gas tanks.

Figs. 1 and 2 show the cupping stage, where the circular plate is cupped, and the cup elongated into a tube by pushing the plate or the

are performed in hydraulic machines, and the power required to do the work is about 50,000 pounds per square inch of reduction of wall area of tube.

The forming of the open end of this shell into a neck is performed in steam hammers, as shown in Figs. 7, 8 and 9, with two, three or more sets of dies, depending upon the diameter and thickness of wall of cylinder. Fig. 10 is the finished cylinder, now ready for heat treatment, threading of the neck and final testing.

Another process of forming is

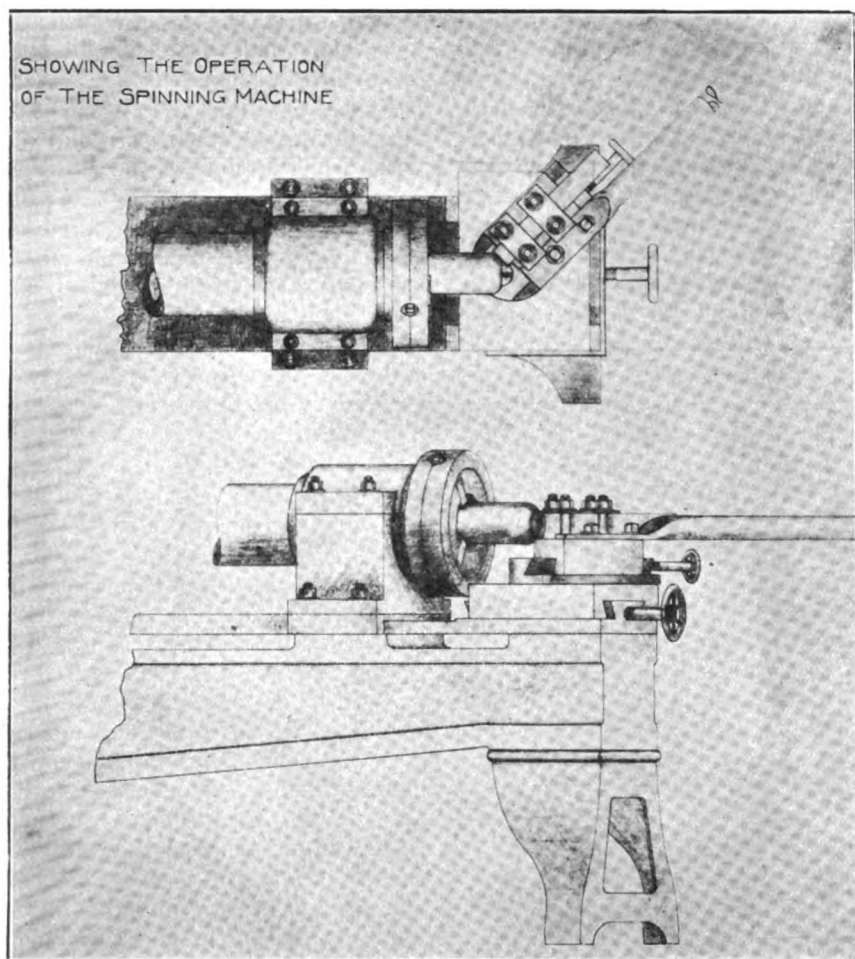


FIG. D—THE SPINNING MACHINE AND HOW IT WORKS

shown in Fig. G (page 271). This is called hydraulic piercing. Formerly this method was quite extensively used in producing seamless tubing, but after being replaced by other and more economical methods, the piercing process remains only as a means of producing hydraulic forgings. This engraving shows the manufacture of an article as shown in Fig. 5, which is the forging for the rotating part in a cream separator. Fig. 1 shows the position of the billet placed in the matrix with the piercing punch above it. In Fig. 2 the piercing is completed.

The power required in this and similar operations of piercing is about 50,000 pounds per square inch of piercing-punch area. Figs. 3 and 4 show the method of closing in the top of the forging.

The forging of a solid-pointed projectile from the solid billet is shown in Fig. H (page 273). In this case, for reasons of convenience, the positions of the tools are reversed. In Fig. 1 the piercing punch is stationary, and the billet containing the matrix is by the action of a hydraulic piston forced down over the punch; thus

piercing the billet. Fig. 2 shows the piercing operation completed, and Fig. 3 is the finished forging.

The illustrations used in connection with this story of seamless tube-making and manipulation are furnished through courtesy by the National Tube Company of Pittsburgh.

A Short Talk on Treating Steel*

CHARLES WESELY
of the A. A. Smith Company

I have been requested to give a little talk upon treating steel in general. To be sincere, allow me to say, it is a very deep study, and therefore I think it is almost impossible for me to give you more than a brief résumé of my long experience along this line, namely, concerning that wonderful metal which we call "steel".

This is a wonderful metal. It is "King of all Metals", because of its great importance in every branch of manufacture. We are living now, as you know, in the "steel age". Look around—steel is used all over. Perhaps we could get along without copper, zinc or lead, but I do not see how we could get along without steel.

Of course you all understand that steel requires intelligent treatment and handling from beginning to end. There often arises a great deal of trouble, however, through men working with steel who are not fully informed and in some cases not allowed sufficient time to give to this metal its proper and required treatment.

I believe it would be much better if the man treating the steel were taken into the confidence of the purchasing department and the "Boss", and fully informed for what purpose the particular steel is to be used. In this way much of the trouble could surely be overcome.

*Address before the Milwaukee Merchants and Manufacturers Association.

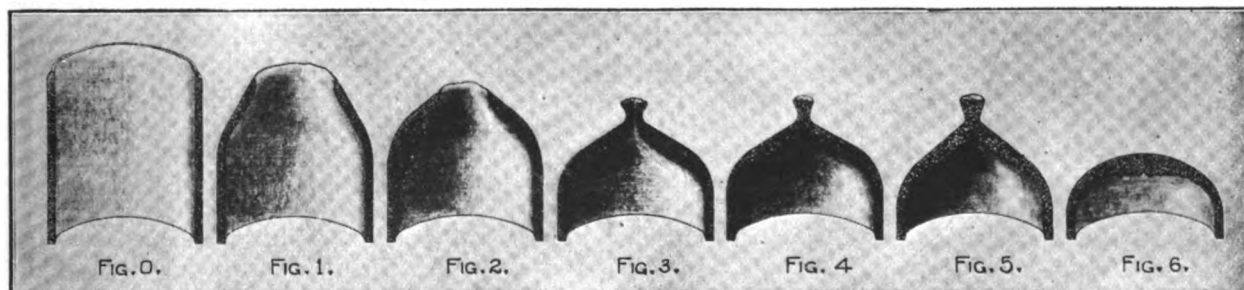


FIG. E—THE VARIOUS STAGES IN THE SPINNING OF A SEAMLESS TUBE END



You, no doubt, know from your own experience that there is a certain amount of trouble in every shop with tools and the hardening of same; particularly dies and delicate tools.

In hardening tools, the first thing the man must know is the grade of the steel. He also should know if the steel was intelligently forged and annealed before he even *attempts* to

treated. Sometimes it is the fault of the man "dressing" the chisel and sometimes of the man hardening it and sometimes it is the steel itself.

First, let us take the "dressing". The chisel should be heated on top of the fire and not in the fire as is often done, because it is very liable to be overheated. Streaks often appear, and often the blast striking the

the fire, even probably overheated long before the body itself will attain the required temperature.

Next, we might say the trouble often lies in the steel itself, and this is the worst trouble of all. Steel for chisels should be about 60% to 70% carbon and rather low in manganese—about 20%. Now, if you should use steel 80% to 90% carbon, and very high in manganese, you can easily see what will happen. The high carbon in the chisel gets overheated very easily, or burns, and the high manganese makes the steel very brittle—and what kind of a chisel have you?

I will give you what I consider the best method of making a chisel. First, I would select the steel with the proper carbon. To forge or dress it, I would use low heat. Instead of taking two heats I would use three or four. The reason I say three or four is because I would not hammer steel too cold. I would not try to hammer the chisel on the edge too much, either, because if you hammer the chisel on the edge you will open the grain, and you lose the fineness which is put in by hammering on the flat side. When the chisel is forged, I think it is a good idea to heat it slowly on top of the fire again and allow to cool until black. The reason is that all the strains are taken out which were put in during the process of forging. After this, I would heat very evenly and slowly on top of the fire and quench the cutting edge in brine, about an inch or an inch and a quarter deep. Then I would immediately transfer to oil. In water, the hardness is obtained and in oil, the toughness. I would then draw the temper slowly until the proper hardness is obtained. This is the usual practice, but in some shops they now have a special furnace for this class of work, which is much better, because the chisel does not come in contact with fire. Also, in case of heavy work, chisel can be treated all over, and the head must be round and a little higher in the center. The reason for it is that it carries the blow of the hammer to the center of cutting edge. The question may arise—"will not such a chisel take too much time?" I think it is better to spend more time making a chisel that will stand up and do the work than one that will break at the first blow of the hammer.

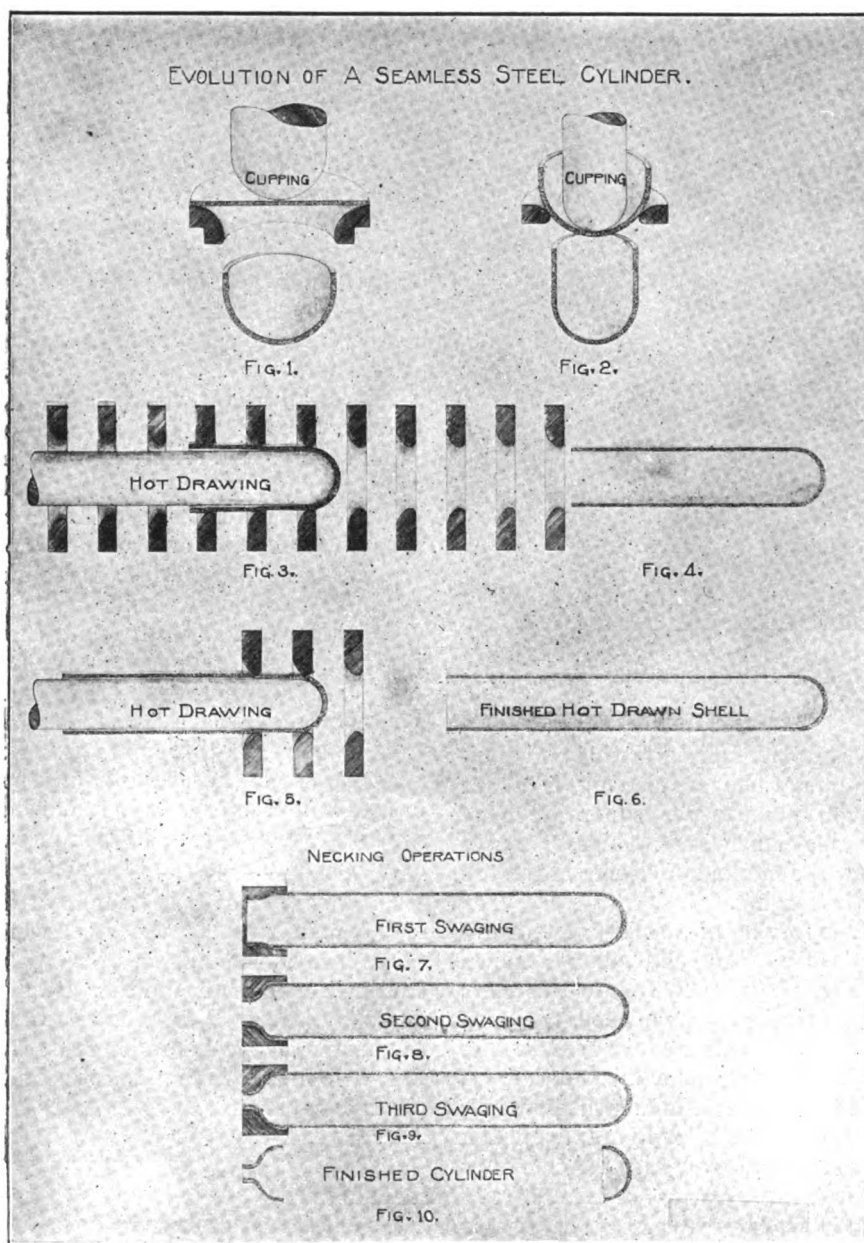


FIG. F—HOW A PLATE IS SHAPED INTO A SEAMLESS CYLINDER

harden it. Of course, if he has not been informed he is taking too much responsibility on his shoulders. Take for example a small chisel which is used every day. How many are injured and many troubles occur because the chisel has been imperfectly

tool will cause the steel to crack, and the cracks are not visible to the eye until the chisel is put to use.

Now, in hardening, other troubles may arise. I repeat, heat the steel on top of the fire, because the corners are apt to be heated too quickly in



I have heard that some steel-makers, especially in England, are making steel which *cannot* be burned but can still be forged at a very high heat. This steel will not crack and is exceedingly tough.

I wish some of our American steel-makers would make an analysis of that steel, as I think metal of that kind would be quite a benefit; first to steel-makers and second to black-

smiths explanation of this wonderful metal.

In conclusion, I would say, the steel-maker makes the steel. It leaves his hand, and then it depends on the blacksmith to develop it into delicate tools. From him it goes to the man using the tool, but it should be remembered that if anything goes wrong it is generally the man doing the forging, annealing, hardening or tempering who gets the blame.

bor Republic and the South is going to blow over without some of us blacksmiths and horseshoers getting a chance to gather any glory. The United States is good enough for me, and about getting cold feet here in Galveston, I can't complain. I am not going to write a learned article today, but will tell you that we surely have some tough jobs here.

The first two weeks I was here, we

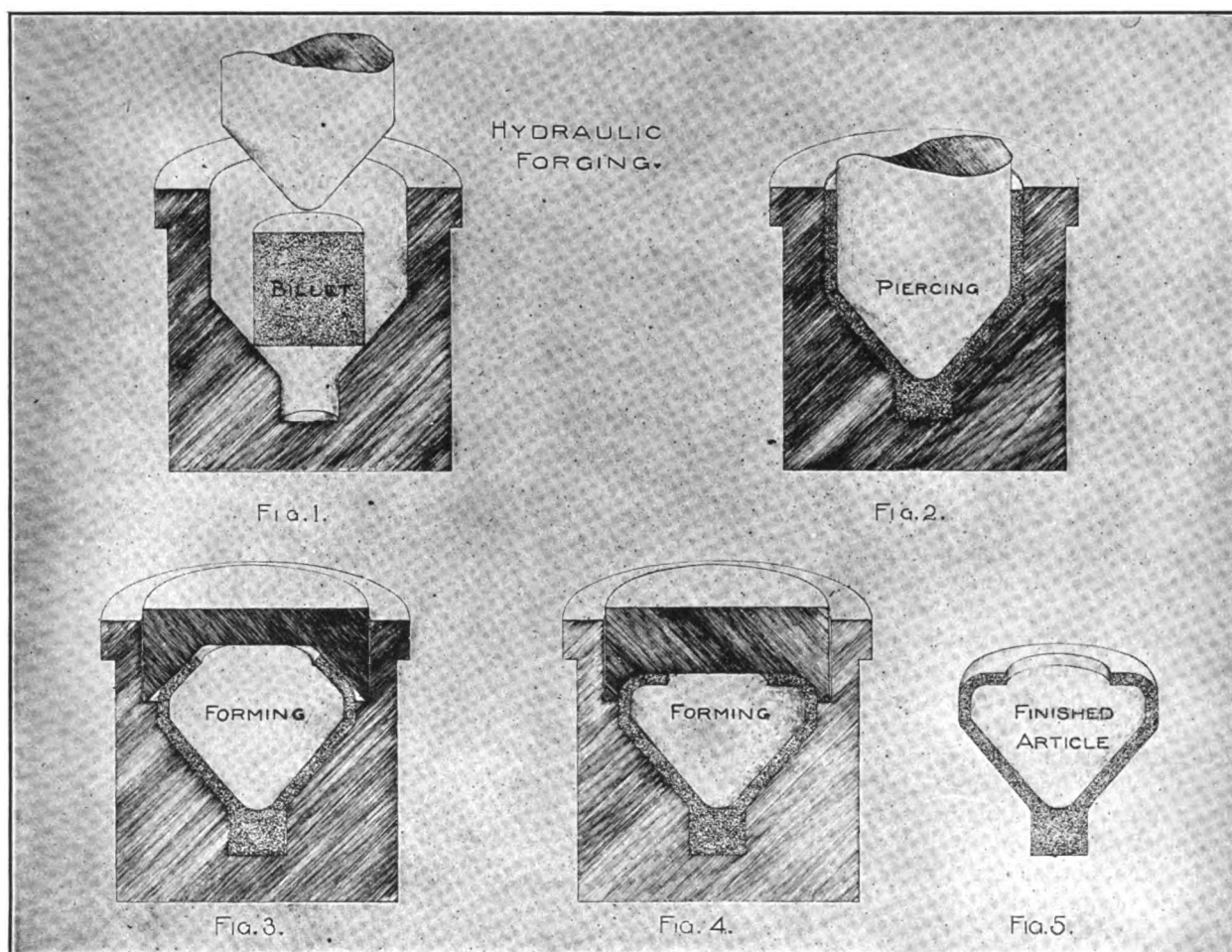


FIG. G—HOW SEAMLESS HOLLOW ARTICLES ARE FORGED FROM THE SOLID BILLET

smiths and tool-dressers, because there is no man so critical as the man who does the forging, annealing and hardening. Such a chisel would certainly be a benefit and would avoid many of the accidents which occur now every day with chisels. The manufacturers would be benefited, also, for accidents mean law-suits, simply because the man who made the chisel was careless, and not having enough knowledge of steel and its treatment in general made a poor job.

Of course, this is a deep subject, and I know that there are others who can probably give to you a better

So I say—success to steel-makers, but honor to the genius of the man who does the forging, blacksmithing and hardening on the truly wonderful metal, “steel”.

From Our Own War Correspondent

FRANZ WENKE

The war scare with Mexico also scared me out of my plethoric serenity at Fort Logan, and caused me to make a race to Galveston, Tex., to prepare to go to Mexico. Well, it seems that the rumpus in our neigh-

had to weld forty axles, 2 by 2 inches; twelve axles, 1½ by 1½ inch; and ten axles, 1¼ by 1¼ inch; all to be shipped to Vera Cruz, Mex. On the 13th of June, we received orders to weld sixty axles, 2 by 2 inches, which went the same way. During our spare time we make some little articles, such as “flying stalls” to hoist mules and horses on board the transports, and heavy “romps” to lead the said animals on board the ships. We also repair wagons, and build new ones to go to Mexico, while others are used here to haul supplies to the ships. We have a great deal



of shoeing to do, and it is nothing for us to have from fifteen to twenty animals each day. There is some hustling to be done here, inasmuch as our equipment is not of the best. We have two forges for the heavy work, and they are too light and old-fashioned. We also have one light boilermaker's riveting forge for the shoeing, and only one drill press and one light tire bender, but no tire shrinker or upsetter. Our helpers are only "roustabouts" who haven't the least idea of blacksmithing. During the last two days, one of our heavy-weight strikers quit and, consequently, only one forge is used to do the heavy axle welding; because two blacksmiths have to strike for the third one, and the fourth man is obliged to do all the shoeing himself. He is fireman, floorman and all.

Thoughts on Timely Topics

BY THORNTON

Caustic Censure and Cheery Comment

THE WEATHER has to take the blame for more things for which it is in no way responsible than a child whose father marries a widow with ten youngsters of her own. And when I hear a smith making excuses about his business and blaming it on the weather, I long for a chance to transport him to the bottom of the ocean, where scientists tell us the temperature doesn't vary from one year's end to the other. These chaps that are always growling about it being too cold or too hot or too wet or too dry to do business, don't usually do much anyway. The only chap that the weather can really help in a business way is the fellow who takes advantage of the weather as it comes; and such a chap usually works the weather for all it is worth. The other fellows usually look up at the sky the first thing in the morning to decide whether they're going to be cheerful or grouchy. Some smiths believe in the almanacs; some swear by the weather bureau; and others don't care a rap about either, but "keep right on a-hammerin'"—rain or shine.

THIS TIME O' YEAR seems to me to be just the time to say a word or two about this vacation matter. And right at the start I want to say that I don't think much of the chap who hangs his apron over the horn of

his anvil any fine morning that the notion strikes him, hikes for home and puts the family comb and brush in the telescope bag and tells his wife he'll be back in a week. That's no vacation. That's just imposing upon the other partner of the family corporation; and any woman who finds her husband doing this quick-get-away stunt, has my permission to light out for mother's just before she expects her lord and master to return to the home roost, and thus give the brute a taste of his own medicine. Of course, no red-blooded man would do anything of the kind, and the chap who does it has about as much circulation as an anti-liquor paper in Kentucky. Now, we're not against vacations, by any means—no sir-ee! We're for 'em, every year. But when you take one, see that the Missus and kiddies take one, too. If the family cash box won't allow an extended sojourn, cut the stay, but don't cut the personnel of the party. One family we know made a camping outfit that will house, feed and sleep seven heads, and every year they get at least two weeks of solid rest, enjoyment and fresh air for about what it costs to keep two cats. If there's a creek, river or lake near by, a good tent and a boat will give you and your family more real healthy fun than the swellest hotel anywhere can promise you, and the cost won't be as much as a single breakfast at the hotel. If you haven't yet had your vacation, talk it over with the Missus tonight and ask the kiddies what they think about it. I'll leave it to them.

HANDLING THE NERVOUS HORSE is about as much of an art as the actual shoeing of the animal. Some so-called smiths seem to get about as much pleasure and satisfaction out of seeing how really uncomfortable they can make an already nervous animal as some boys do in teasing a fly; and when one of these shoers gets what he really deserves from a nervous animal, that he has simply made more nervous by his smart-Alecky actions, it usually takes him some time to get back to the shop. We knew one chap who, after shoeing a rather skittish animal with nerves about as sensitive as a bald-headed man's in fly-time, tied the beast short next to a quiet animal upon which he was working. Continued jogging and pushing on the part of the shoer

didn't improve the feelings of the already badly unstrung beast, when finally a half wheel, and a kick for goal, placed what was left of the shoer in bed where he stayed for some time. Of course, it was hard on the shoer, but then horses are sensitive, and many of them have as fine a set of high-strung nerves as a woman prone to hysterics on the slightest provocation.

American Shoes Help English to Win Polo Cup

The real reason for England's triumph in the International Polo Contest, in June last, was told by James J. Fox, of Long Island, shortly after the departure of the English Polo Team. It seems that Mr. Fox has been making special polo shoes for several years and, when the English team landed, he suggested the use of his special shoes to Mr. Faulkner, trainer of the British team.

Eventually the 12½-ounce British-made shoes were replaced with 7-ounce shoes of American design and make, and thus was an International contest decided.



Around Our Forge Fire

Benton Talks On Electroplating.

"Um-hum!" unconsciously murmured Benton as he turned the end of his newly-lit cigar in his mouth and, elevating his feet to a more comfortable angle, gazed reflectively out of the window; a bluish aureole of smoke surrounding his head, and hazy gray waves permeating the air of the room.

The Editor was busy with a batch of proofs that had come in late. Benton sighed. With head cocked to one side he began blowing halos of smoke that, sailing upward, grew from the size of a finger ring to a barrel hoop. Suddenly, Benton roused himself as though some huge idea had just suggested itself. He put action to his thoughts so quickly and noisily as to draw forth a murmur of protest from the Editor. Thus



humbly restrained, the man of recipes proceeded to extract the latest issue of "Our Journal" from the Editor's desk. Then he sat down again and intently surveyed the pages of the July number. Silence reigned, with the occasional scraping of a pencil and the crackling of a turning page—

"Ah! I see—" began Benton as he turned a page.

"Just a minute—" interrupted the Editor, "and I'll be with you." He placed the proofs in an envelope and handed them to the boy.

"What were you saying, Benton?"

"Why, I was just noticing that you are taking up electroplating," he answered.

"Well, what do you know about it?" questioned the Editor, right to the point.

"Don't know so much about it," replied Benton, "but I have run across several shops that are doing this work."

"How does it pay them?" asked the Editor, eagerly.

"Well," said Benton, "let me tell you the story. You remember old man Lendrum, down near Bradford? You know, Jake Lendrum—he just built a new shop, on your suggestions? Well, he's taken his son into the business. He's getting pretty well along in years, you know, and wants someone to keep up the old stand. The other day when I dropped in there I was nosing 'round as usual and I noticed a new double-spindle emery stand without any wheels on it, to which I didn't give particular thought until after I had walked into a well-lighted room containing a number of tanks and some funny looking wires.

"What's this?" I demanded of the old man, pointing to nowhere in particular in the room.

"That? Why, that's a rheostat."

"No, I mean all this," I said, waving my hand about the room.

"Oh!" he replied, "that's our electroplating department." And then he said, "I'll tell you how it was, Mr. Benton. You know my son—my son, Alf—he's got the electricity bug, like all young fellers. A couple of years ago he asks me for money to buy electrical stuff, and I says, "no; no money for such tomfoolery"; and he says, "all right, pa, I'll get some." So he works hard and gets some money and buys some truck. But he wants more, always more. So he hits upon this idea of electroplating and, mind yuh, the kid goes around, takes orders and—did you see those wires on the roof of the house? Well, he bought that wireless set with the money after he had fixed up his outfit. So when I takes him in business, he says to me, he says, "Now, pa, we can buy a good electroplating outfit and do more work, eh, pa?" And so there it is."

"And how are the prices?" I asked him.

"Good," he replied. "You see, we're the only shop that does this work around here. Of course, we get all the trade and have no price-cutting competitor to buck up against. But then, electroplating prices are good, anyway. There's a peculiar thing about electroplating; it's what you might call a "flexible" trade. By that I mean, Mr. Benton, you can't set exact prices on jobs. If you should come to me and say, "Lendrum, I've got some brass gas fixtures I want nickel-plated. They are so-and-so many and they are of such a size, how much will it cost?" I couldn't give you a price no more'n fly. There are so many different things to consider, that you can only tell by looking at the article. The condition, the shape, the grinding and buffing to be done before plating and the cleaning, the amount of plate deposited and the final polishing and buffing—all these have to be reckoned before we can give a price. And my son he says, "Pa, before you give a price you want to ask me about it; two heads

are better'n one, you know." He's been almost three years at the work, Alf has, and he knows a bit about it. So we both figure on a job and always make a good profit on it."

"Of course, Mr. Benton," Lendrum said, "there are some articles we can give an estimate on. Now take knives, for instance, we get about \$2.50 for silverplating a dozen; forks, \$2.00 a dozen; teaspoons, \$1.50 a dozen; other tableware varying according to the size. For nickelplating that bicycle handle-bar you see over there I get \$.50; for nickelplating the parts on a Ford automobile, such as lamps, radiator and so on, we charge from \$8.50 to \$10.00; on a Cadillac, Chalmers, etc., medium-sized cars, \$12.00 to \$18.00, and on a big touring car like the Pierce, about \$25.00. But it's just as I said before, Mr. Benton, you can't give a price on a job in single or quantity lots unless you see the articles. Copperplating costs about half that of nickelplating; and goldplating depends upon the amount of gold deposited. Goldplating

means expense; but there is good money in it, as you can charge anywhere from 50% to 100% profit."

"Then," continued Lendrum, "I can generally make from \$.25 to \$2.00 more on smithing jobs that I nickelplate on my own say-so. It makes such a good appearance that the extra price doesn't bother the people at all, and there's lots of jobs you can do it on, too."

"So you think electroplating is a paying investment?" I asked him.

"It sure is, Mr. Benton," he answered, "if you get right after it and make it pay. We built the tanks ourselves, some of the polishing wheels, and bought the chemicals and some other necessary apparatus. My son, he fixed up the electrical part himself, and now we're thinking of getting a dynamo."

"That's one man's story," said Benton, removing himself from the chair to allow the Editor to open the window so as to dispel the highly concentrated odor of educated cabbage.

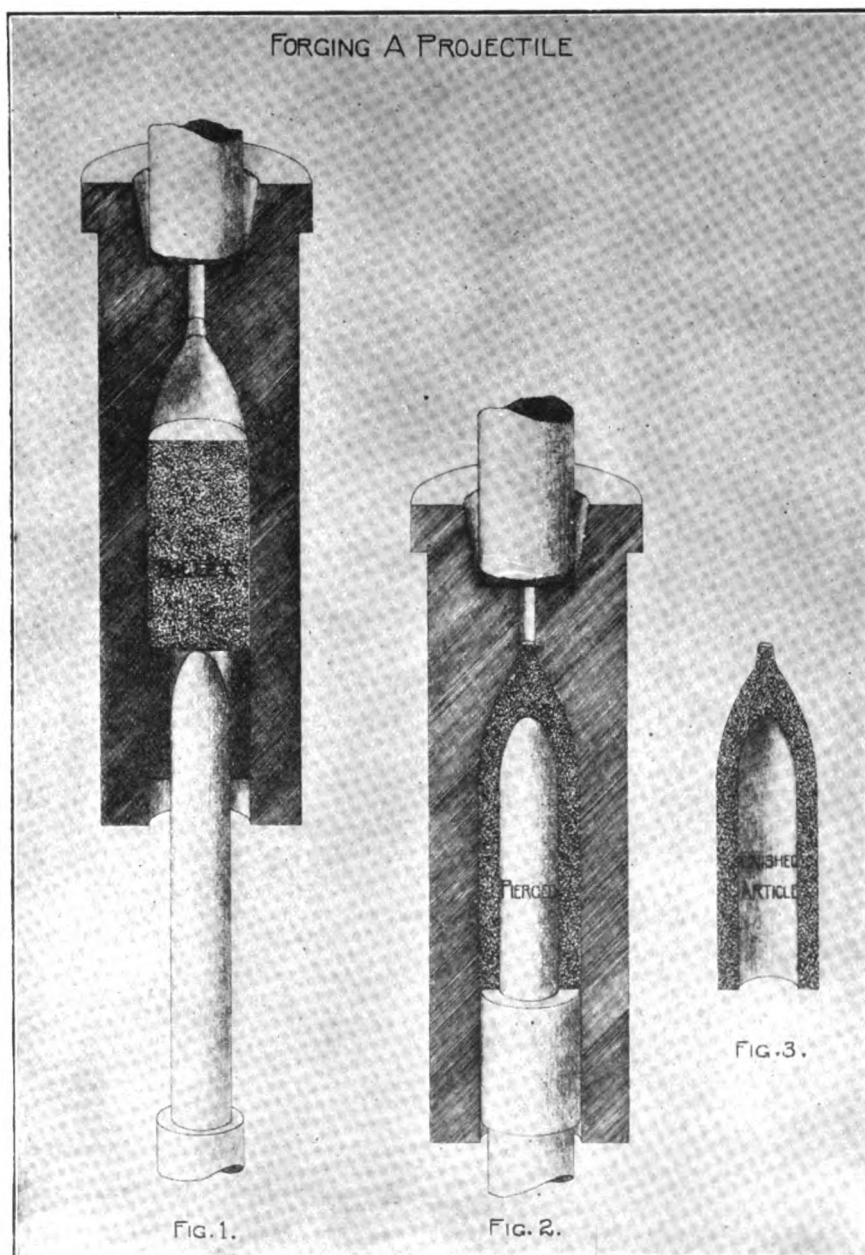


FIG. H—THE FORGING OF A SOLID POINTED PROJECTILE IS HERE SHOWN



Values

Being the Story of Two Wagon Builders,
as told by Walt Mason in *System*

Old Hiram Hucksmith makes and sells green wagons with red wheels; and merry as a string of bells in his old age he feels. For over all the countryside his wagons have their fame, and Hiram sees, with wholesome pride, the prestige of his name.

He always tells his men: "By jings, my output must be good! Don't ever use dishonest things—no wormy steel or wood; use nothing but the choicest oak, use silver-mounted tacks, and every hub and every spoke must be as sound as wax. I want the men who buy my carts to advertise them well. I do not wish to break the hearts of folks to whom I sell."

The farmers bought those wagons green, with wheels of sparkling red and worked them up and down, I ween, and of them often said: "You cannot bust or wear them out, and if you'd break their holt, you'd have to have a waterspout or full-sized thunderbolt. The way they hang together's strange, they ought to break, but won't; most earthly things decay or change, but these blamed wagons don't."

Old Hiram's heart with rapture thrilled, to hear that sort of stuff; he worked and worked, but couldn't build his wagons fast enough. And now he lives on Easy Street, most honored of all men who toddle down our village street and then back up again.

Old Jabez Jenkins long has made blue wagons with pink spokes, and once he had a goodly trade among the farmer folks. With pride his bosom did not swell, he knew not to aspire; to get up wagons that would sell—that was his one desire. And so he made his wheels of pine, where rose-wood should have been, and counted on the painting fine, to hide the faults within.

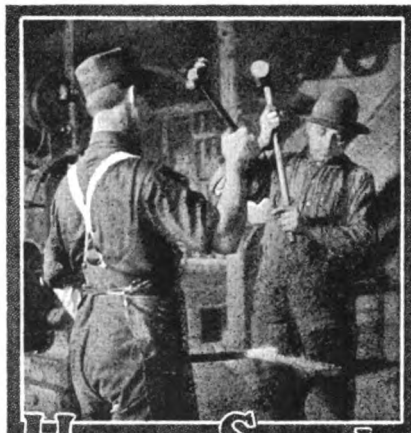
And often when this sad old top was toiling in his shed, a customer would seek his shop and deftly punch his head. Wherever Jenkins' wagons went, disaster with them flew; the tires came off, the axles bent, the kingbolts broke in two. You'd see the farmers standing guard above their ruined loads, and springing language by the yard that fairly scorched the roads.

This Jenkins now is old and worn, his business is decayed; and he can only sit and mourn o'er dizzy breaks he made. Old Hiram's plan should suit all men who climb Trade's rugged hill: Give value for the shining yen you put into your till.

About Ruts

The World is full of ruts, my boy, some shallow and some deep,
And every rut is full of folks as high as they can heap.
Each one that's groveling in the ditch is growling at his fate,
And wishing he had got his chance before it was too late.
They lay it all on something else, or say 'twas just their luck;
They never could consider it was just their lack of pluck.
Now, here's the word of one who's lived clear through from soup to nuts—
The Lord don't send no derricks down to h'ist folks out of ruts.

—Exchange.



Heats, Sparks, Welds

Look before you sign your name.

Don't let the hot weather wilt your ambition nor fire your temper.

Nothing in the universe is in a state of complete rest—except Tom Tardy and his kind.

When a man brags of how *quickly* he can do work, watch him and see how *well* he does it.

The very advertisement you miss in this number, may be the one that's most useful to you. Read them all.

It's pretty hard to lose a customer after giving him your best service and doing his work as best you can. In fact, it's almost impossible.

Put your trust in the Honest Dealings notice that appears in the advertising section. It's an insurance policy that costs you nothing. Read it.

What have you learned about vulcanizing? No reason why you cannot do this work and pull in some of the long green that goes with it; and it's easy when you know how.

How about that vacation? If you cannot make it a week or two, then take a day or two each week; and don't forget the Missus and the kiddies. If you cannot take 'em, better stay home.

Remember, you are your competitor's competitor, and you are not so bad, are you? Just tie up to a few thoughts along that line, and you'll find that competition can be made the life of trade.

The condition of a machine may seriously affect the work it does. Are your machines in proper condition to do perfect work? A few minutes each day on frequently used machines will keep them right.

Sammy Smiles blew in the shop the other day and got us all so cheered up that we had to ask him the secret process. "Well," says he, "laff every time you feel tickled, and laff once in a while, anyhow."

Good work and good prices are of course necessary to reach success in the smithing business, but if a shop-owner hasn't the respect and confidence of the community, he may as well sell out to some chap who can get it.

Profit isn't interest on the investment—it isn't salary paid for running the business. Both these items are due the proprietor as investor and manager. If he pays a profit after these items are paid, will depend upon his business ability.

How much stock and stuff have you about the shop that has just been gathering dust instead of paying a profit? Better get some money out of it and get rid of it. The space some of this stuff takes up is worth more than the material itself. Look at the matter

from the money end and then turn it into money.

It may help some to explain what you are doing in terms that will mean something to your customer; otherwise he may not know whether you are shoeing his horse for contraction of the podophyllus tissue or for malformation of the frog; and in matters of this kind is where that new shoeing chart fits in tight.

To do certain things in a certain way is eminently proper, but we now want quicker methods, more serviceable systems. We want things "right now"; and the concern that gives them to us—right off the bake-stone—is the one that gets our business. Do your customers give you their trade for that reason?

Two years is not too young for the first shoe to be put on a colt, but at this age, when their training has just started, the bones and muscles of the youngster have not yet gotten their full growth and strength, and in order to avoid breakage to the hoof and other damage to the foot it is advisable to apply hoof wear.

The tailor who keeps the "Fall and Winter Styles" sign in his window all through summer is getting scarcer every day. How about sending out a batch of seasonable advertising to your customers? Ask your folks if the plows are right for fall work—tell 'em to look ahead a bit, so as not to come in when everyone wants everything done at once.

Some chaps are just the jolliest fellows when you meet them at lodge or in "meet-in'", but if you were to see them at home, you'd take them for different men entirely. Hope there aren't any smiths like that. It's a mighty good idea to scatter some jokes and sunshine about the house when you get home. Funny thing about smiles, the more you give, the more you have and the more you have to give. Try it.

A smith cannot afford to imitate the "get-rich-quick" man. Usually the smith is permanently located. To be successful, to make money, he must sell to the same customers over and over again; he must treat them square every time they come to him; he must build up a reputation for honesty, full value and square dealings; he cannot afford to do anything that does not give his customers just exactly what they pay for.

Figures are like bees—it's all in the way you handle 'em. If you don't handle 'em right, you're likely to get stung. Take profit figures, for example—if you don't know just exactly how to use them, how to place and how to arrange them, you'll miss your figures at the end of the year. You'll wonder why your actual cash is somewhat less than the amount you figured on. To know how to handle bees you must study them—to know figures you must study them.

He is a familiar type—the fussy, fretful man who imagines that he is about the busiest fellow in town.

He often dumps in the waste basket unwrapped copies of business or technical magazines that contain valuable articles bearing directly on his problems. He fondly believes that he is too busy practicing to bother with what others are "preaching."

The trouble with this type of a man is that he has not learned that the real executive is the man who so plans his work as to leave a reasonable amount of time for reading and planning.

There are shoals and breakers ahead when the accumulation of new ideas ceases. The man who declares he has no time to read, is unconsciously advertising his small caliber, his slavery to detail, his arrested development.—*Printers' Ink.*



Our Honor Roll

Watch That 1924 Bunch

Have you noticed how the Class of 1924 has gradually been growing until now they nearly outnumber the 1923 group? It is certain the 1924 boys will outnumber their 1923 brothers before the year is up. Of course, it's easy to get into that 1924 group. All you need do is to send in your order and remittance for a ten-year period, and there you are—your subscription account taken care of for several years—no more trouble, bother or annoyance and, then, too, your name will be on Our Honor Roll.

And the saving you make is important—don't overlook that.

	U. S. and Mexico	Canada	Other Countries
2 yrs.....	\$1.60 save \$.40	\$2.00 save \$.50	10 sh. save 2 sh.
3 yrs.....	2.00 save 1.00	2.70 save 1.05	14 sh. save 4 sh.
4 yrs.....	2.50 save 1.50	3.20 save 1.80	18 sh. save 6 sh.
5 yrs.....	3.00 save 2.00	3.75 save 2.50	1 £ save 10 sh.
10 yrs.....	5.00 save 5.00	7.00 save 5.50	1 £ 14 sh. save 1 £ 6 sh.

Send your order and remittance now—today. Don't wait until you forget all about it. You'll never regret it. Our subscription insurance saves you money. The sooner you begin saving the more you save. There is no time better than NOW.

NAME	Subscription Paid to	NAME	Subscription Paid to
THE FIX-IT SHOP, Utah.....	July, 1935	T. TRIMMERS, Que.....	Sept., 1922
W. C. WATT, Kan.....	Dec., 1930	A. PLEIFFER, Ohio.....	Aug., 1922
WADDINGTON FARM, W. Va.....	Mar., 1928	W. D. VALENTINE, Iowa.....	Aug., 1922
I. J. STITZ, N. J.....	Jan., 1928	G. HOFFMAN, N. Y.....	July, 1922
E. PRICE, Ill.....	Feb., 1925	J. ERMAN, Ark.....	July, 1922
J. H. DAVIS, Cal.....	Dec., 1924	W. K. W. HANSEN, Pa.....	June, 1922
H. L. FENTON, N. Mex.....	May, 1924	ROBERT TOCHTER, Cal.....	June, 1922
J. CARL, Iowa.....	May, 1924	J. VAN MANTER, N. Y.....	June, 1922
J. E. LITTLE, Penn.....	May, 1924	E. ANDERS & SON, S. Aus.....	May, 1922
W. E. PARR, Iowa.....	Apr., 1924	LOUISA CARRIAGE Wks., Va.....	May, 1922
F. SHAMKE, Neb.....	Apr., 1924	S. SMITH, Tex.....	Apr., 1922
L. A. HULLEN, Cal.....	Apr., 1924	J. W. HAAR, La.....	Mar., 1922
A. HULTSTRAND, N. D.....	Mar., 1924	E. A. DILLON, Nev.....	Mar., 1922
B. F. SEIBERT, Cal.....	Mar., 1924	D. W. SMITH, R. I.....	Mar., 1922
H. ROMSCHWITZER, Mo.....	Mar., 1924	D. F. KUTNER, Wash.....	Mar., 1922
W. B. BRIANT, N. J.....	Mar., 1924	G. F. JOHNSON, Mich.....	Feb., 1922
A. BOSCH, N. Y.....	Mar., 1924	R. H. KNUTE, Iowa.....	Jan., 1922
A. R. JOHNSON, R. L.....	Feb., 1924	J. H. ICKES, Penn.....	Dec., 1921
F. JACOBS, Ohio.....	Feb., 1924	O. M. JOHNSON, Minn.....	Oct., 1921
A. J. FREY, Ill.....	Jan., 1924	H. FELDUS, Neb.....	Sept., 1921
H. D. ENGLISH, Va.....	Jan., 1924	W. K. KLING, Kan.....	May, 1921
E. G. WALKER, Cal.....	Jan., 1924	F. NORMIE, Yukon Ty.....	Jan., 1921
E. FOWLER, Pa.....	Jan., 1924	J. L. JESTER, Mo.....	Jan., 1921
BRENN & SON, Ireland.....	Dec., 1923	T. P. CONSIDINE, Mass.....	Dec., 1920
M. LAMORRAUX, Ohio.....	Dec., 1923	ED. GRIMM, Tex.....	Mar., 1920
C. R. DAVIS, N. Y.....	Dec., 1923	R. S. CHALLER, Ky.....	Jan., 1920
F. W. COPLAND, Me.....	Dec., 1923	P. REIF, Ohio.....	Dec., 1919
J. L. TOMLIN, Kans.....	Dec., 1923	P. GUDMUNDSON, S. Dakota.....	Nov., 1919
H. A. DAVIS, N. Y.....	Dec., 1923	R. RAMAGE, N. W. Ter.....	Nov., 1919
E. H. TROYER, Ill.....	Dec., 1923	J. NAIMITH, N. Zealand.....	Nov., 1919
J. BAILEY, Mar.....	Dec., 1923	A. DISCHER, No. Queens.....	Aug., 1919
F. WATKINS, N. H.....	Nov., 1923	F. UNDERWOOD, S. Africa.....	Aug., 1919
J. KOPFINS, Ala.....	Nov., 1923	J. T. WILSON, S. C.....	July, 1919
W. C. LINDERT, S. Aus.....	Oct., 1923	F. RASS, Sask.....	June, 1919
W. B. ABELL, N. Y.....	Oct., 1923	M. DUROISE, Miss.....	May, 1919
W. R. TURNER, Mar.....	Oct., 1923	THEO. PASCHER, Neb.....	Apr., 1919
C. NELSON, Neb.....	Sept., 1923	I. M. TOWNSEND, Cal.....	Apr., 1919
O. W. TAYLOR, Pa.....	Aug., 1923	G. BISH, Fiji Islands.....	Apr., 1919
CRAMPTON BROS., Tex.....	Aug., 1923	G. D. GAMBEL, Mass.....	Apr., 1919
L. C. LARSEN, Iowa.....	July, 1923	G. INGRAM, Va.....	Apr., 1919
S. EFTENHAAR, S. Africa.....	July, 1923	WYPER BROS., Queens.....	Mar., 1919
G. L. DEWITT, Mont.....	July, 1923	A. ROGERS, N. Y.....	Mar., 1919
W. W. GREGG, Tex.....	July, 1923	P. W. FORRETT, Me.....	Mar., 1919
O. C. YOUNG, Mich.....	June, 1923	C. HUBMAN, Colo.....	Mar., 1919
OTTO SUFFEL, Penn.....	June, 1923	ONONDAGA FORGE CO., N. Y.....	Mar., 1919
A. CRAFTMAN, N. Y.....	June, 1923	A. F. BOWMAN, Ohio.....	Mar., 1919
C. BIRLEY, Md.....	June, 1923	C. WILLIAMS, W. Aus.....	Mar., 1919
F. H. SHUPP, Penn.....	June, 1923	J. P. MACKIN, N. D.....	Mar., 1919
J. C. STOVER, Penn.....	Apr., 1923	E. RABT, Kan.....	Mar., 1919
W. SCHONOVER, Penn.....	Apr., 1923	C. T. HASKINS, N. Y.....	Feb., 1919
J. B. RUNNIE, Iowa.....	Mar., 1923	N. E. KOCH, Cal.....	Feb., 1919
LOWMEYER BROS., Mo.....	Mar., 1923	C. W. M. BURROUGHS, N. J.....	Feb., 1919
J. CARSWELL, Ark.....	Mar., 1923	L. ARSTNER, Ohio.....	Feb., 1919
G. E. GLASHER, Ohio.....	Mar., 1923	R. TAYLOR, N. Zealand.....	Feb., 1919
T. BRADLEY, N. S. Wales.....	Mar., 1923	R. STRODE, Ore.....	Feb., 1919
G. FATH & CO., S. Africa.....	Mar., 1923	LENNAN BROS., Ill.....	Feb., 1919
I. T. NEEDHAM, Ill.....	Feb., 1923	O. N. BENNINGER, Penn.....	Feb., 1919
G. C. DINGINGER, Miss.....	Feb., 1923	W. HARBENAPPE, S. Africa.....	Jan., 1919
J. HUGHES, Ohio.....	Feb., 1923	J. J. BEGERHOLM, Cal.....	Jan., 1919
J. WIEBER, Minn.....	Jan., 1923	L. A. TINKING, Kans.....	Jan., 1919
Z. A. ENOS, Kan.....	Jan., 1923	W. S. WAGNER, Tex.....	Jan., 1919
W. G. WISE, Cal.....	Jan., 1923	J. G. GROLUND, Conn.....	Dec., 1918
F. S. BISHOP, S. Africa.....	Jan., 1923	BROWN & SCULLY, N. S. W.....	Dec., 1918
S. P. HARNETT, Mont.....	Dec., 1922	A. HOSAD, Minn.....	Dec., 1918
W. BRECKNER, Okla.....	Dec., 1922	E. P. HOWES, Mass.....	Dec., 1918
J. PABIAN, Neb.....	Dec., 1922	C. N. ROBINSON, Vt.....	Dec., 1918
P. FREDERICKSON, Iowa.....	Nov., 1922	F. TRELEGAN, N. J.....	Dec., 1918
L. O. LUTHER, Ill.....	Nov., 1922	G. F. VINCENT, N. Y.....	Dec., 1918
W. LAWSON, N. Z.....	Nov., 1922	J. R. CONRAD, Kan.....	Dec., 1918
W. O. GRANT, Cal.....	Oct., 1922	A. O. GIBBOUX, Mass.....	Dec., 1918
W. H. MILLER, Iowa.....	Oct., 1922	A. A. MURRAY, Tex.....	Dec., 1918
A. O. MARTIN, Idaho.....	Sept., 1922	C. W. BRAKE, Mich.....	Dec., 1918
O. A. MORTIMORE, Idaho.....	Sept., 1922	J. DUBENDORF, Penn.....	Dec., 1918
H. J. WYATT, Wash.....	Sept., 1922	G. F. LAUGHLIN, Ill.....	Dec., 1918
J. N. SKOW, Iowa.....	Sept., 1922	L. M. PLATT, Penn.....	Dec., 1918
A. D. STANDFORD, Wash.....	Sept., 1922		

NAME	Subscription Paid to	NAME	Subscription Paid to
F. BOECKMAN, Ill.....	Dec., 1918	P. SHIRMMIN, Cal.....	Jan., 1918
W. H. HABERMERL, Iowa.....	Dec., 1918	J. B. BETTEL, Me.....	Jan., 1918
E. T. MARSHALL, Wis.....	Dec., 1918	W. MISCALE, Queens, Aus.....	Jan., 1918
F. HOOPENGARDNER, Md.....	Dec., 1918	S. PORTELANCE, Que.....	Jan., 1918
HERREW TECH, Inst. N. Y.....	Dec., 1918	D. C. FOLEY, Cal.....	Jan., 1918
G. E. WINCHESTER, Cal.....	Dec., 1918	GLEASON BROS., La.....	Jan., 1918
F. T. GRISHAM, Ark.....	Dec., 1918	C. E. KRUG, Wis.....	Jan., 1918
W. TAIT, N. Zealand.....	Nov., 1918	G. E. WOODARD, Kan.....	Jan., 1918
A. LARSEN, N. Z.....	Nov., 1918	P. J. DALLY, W. Aus.....	Jan., 1918
R. E. RUSSELL & SON, Penn.....	Nov., 1918	J. MORROW, Penn.....	Jan., 1918
H. SCHAFER, S. Dakota.....	Nov., 1918	J. MOORE, N. S.....	Dec., 1917
D. MACDONALD, N. S. W.....	Nov., 1918	J. S. JOHNSON, Iowa.....	Dec., 1917
C. A. RITCHIE, Scot.....	Nov., 1918	C. W. MUNROE, Mass.....	Dec., 1917
T. E. SANDERS, Eng.....	Nov., 1918	O. HOGA, N. D.....	Dec., 1917
G. E. HARCADISTE, N. Y.....	Nov., 1918	G. W. MILLER, Penn.....	Dec., 1917
W. VALLANCE, N. Y.....	Nov., 1918	G. M. SETHMOUSE, Ill.....	Dec., 1917
C. ZIERKE, Iowa.....	Nov., 1918	J. TEMPLETON, Scotland.....	Dec., 1917
CYCLONE GATE & FENCE CO., S. Africa.....	Oct., 1918	F. PROCTER, Tas.....	Dec., 1917
W. ALSON, Minn.....	Oct., 1918	J. G. JOHNSON, Ill.....	Dec., 1917
H. P. BOWERMAN, N. D.....	Oct., 1918	F. E. EGLERS, Ohio.....	Dec., 1917
J. DELANE, Neb.....	Oct., 1918	C. T. FORREST, Cal.....	Dec., 1917
P. DEVERNEY, Vict.....	Oct., 1918	THEO. BUSE, N. Y.....	Dec., 1917
H. C. HENDERSON, Queens.....	Oct., 1918	J. T. ELLIOTT, Ill.....	Dec., 1917
J. ELEY & SONS, S. Aus.....	Oct., 1918	J. VOELPEL, Ill.....	Dec., 1917
J. E. MATTHEWS, Eng.....	Oct., 1918	W. J. MAIN, Cal.....	Dec., 1917
MUNRO & CO., N. Z.....	Oct., 1918	J. G. LAUER & SONS, Mo.....	Dec., 1917
D. R. WINTON, N. S. W.....	Oct., 1918	MESSE BROS., Victoria.....	Dec., 1917
E. SCHRAPEL, S. Aus.....	Oct., 1918	E. BLOOMER, Aus.....	Dec., 1917
A. QUAY, S. Africa.....	Sept., 1918	I. N. PETER, Ore.....	Dec., 1917
J. WILKINSON, Queens.....	Sept., 1918	W. A. REAGAN, Pa.....	Dec., 1917
GRIMLEY, LTD., N. S. W.....	Sept., 1918	H. P. ADAMSON, N. Zealand.....	Dec., 1917
C. E. BIRLEY, Md.....	Sept., 1918	C. E. RHYME, N. Y.....	Dec., 1917
J. F. BAGGETT, Queens.....	Sept., 1918	J. H. ROBERTS, Mich.....	Nov., 1917
J. THORNTON, N. W. Ter.....	Sept., 1918	G. E. BARTELL, Wash.....	Nov., 1917
W. A. THUGER, Queens.....	Sept., 1918	F. FROELICH, Tex.....	Nov., 1917
A. L. VARRIE, S. Africa.....	Sept., 1918	J. A. SHEPARD, N. Y.....	Nov., 1917
GEO. A. PETTY, Utah.....	Sept., 1918	McMILLAN, HEAD & CO., S. Africa.....	Nov., 1917
G. W. HARTLEY, Pa.....	Sept., 1918	C. ANDERSON, Queens.....	Nov., 1917
C. WALTER, Ore.....	Sept., 1918	J. KILGOUR, Scotland.....	Nov., 1917
T. B. HOLT, Okla.....	Sept., 1918	F. R. TOMLINSON, Kan.....	Nov., 1917
ROBERT COOK, Ky.....	Sept., 1918	KAY & ADLEY, Eng.....	Nov., 1917
A. B. WENDLANDT, Wash.....	Sept., 1918	T. H. ZIEGLER, Wis.....	Nov., 1917
A. J. BROOKMAN & CO., Vic.....	Sept., 1918	SCHOLLER BROS., Ind.....	Nov., 1917
PETER COCKE, W. Aus.....	Sept., 1918	E. M. WUNSTER, Mich.....	Nov., 1917
R. J. TOMPKINS, Texas.....	Sept., 1918	S. Z. FREY, Ind.....	Nov., 1917
J. VASCHETTI, Colo.....	Aug., 1918	B. A. STRIDKER, Ohio.....	Nov., 1917
E. C. PUXTON, S. Aus.....	Aug., 1918	J. N. BATHGATE, N. Dak.....	Nov., 1917
V. D. SIBLEY, B. C.....	Aug., 1918	W. H. HUGHTON, Penn.....	Nov., 1917
L. SMITH, Cal.....	Aug., 1918	G. W. BOOKER, La.....	Oct., 1917
W. CRIBB, Queensland.....	Aug., 1918	C. R. WALTERS, Ill.....	Oct., 1917
GEO. REID, S. Africa.....	Aug., 1918	S. SMITH, S. Aus.....	Oct., 1917
H. KLEINBERG, N. J.....	Aug., 1918	W. STEPHEN, Queens.....	Oct., 1917
W. D. BRADFORD, Cal.....	Aug., 1918	W. T. CUTKOMP, Iowa.....	Oct., 1917
T. H. GRAHAM, Vic.....	July, 1918	GEO. POTTSCHKE, Mo.....	Oct., 1917
GILBERT BROS., S. Aus.....	July, 1918	W. C. RONEY, Penn.....	Oct., 1917
A. MACKENZIE, W. Aus.....	July, 1918	J. N. MILES, Ky.....	Oct., 1917
GEO. DAHE, N. Zealand.....	July, 1918	C. L. THOMPSON & SON, N. S.....	Oct., 1917
C. R. OLIVER, S. Africa.....	July, 1918	EMIL PLATE, N. D.....	Sept., 1917
L. G. REID, S. Africa.....	July, 1918	F. STAUP, Ohio.....	Sept., 1917
W. M. PURYEAR, Ala.....	June, 1918	B. T. LARSON, Minn.....	Sept., 1917
THOM & VESTER, S. Africa.....	June, 1918	H. SCHOONOVER, N. Y.....	Sept., 1917
L. LACASTE, Que.....	June, 1918	PERFECTION SPRING CO., O.....	Sept., 1917
WRIGHT & SON, Texas.....	June, 1918	W. A. WILSON, N. Z.....	Sept., 1917
ALBERT MELLUM, N. D.....	June, 1918	R. ROSS, N. S. Wales.....	Sept., 1917
J. LINDSAY, S. Africa.....	June, 1918	I. E. STROUD, Me.....	Sept., 1917
J. H. GIBBS, S. Africa.....	June, 1918	FRED. BLOHM, Tex.....	Sept., 1917
W. W. BRIDGES, Ark.....	June, 1918	R. E. MATTOX, Va.....	Aug., 1917
MATHEWSON BROS., Iowa.....	May, 1918	C. T. WOOD, Kans.....	Aug., 1917
ED. HOLLAND, Queens.....	May, 1918	GEO. B. HEATON, N. J.....	Aug., 1917
H. L. HASWELL, N. C.....	May, 1918	CLARK & FAUBERT, Queens.....	Aug., 1917
CHRISTENSEN BROS., Cal.....	May, 1918	C. L. HOCKETT, Cal.....	Aug., 1917
W. H. COLLETT, S. Africa.....	Apr., 1918	H. C. STERNEL, Tex.....	Aug., 1917
G. F. BRACKETT, Wash.....	Apr., 1918	M. DEJAGER, S. Africa.....	Aug., 1917
E. KOPPEL, Wis.....	Apr., 1918	F. HOWARD, Kan.....	Aug., 1917
J. H. MARTIN MFG. CO., Ind.....	Apr., 1918	H. FREER, Ill.....	Aug., 1917
H. S. WATNEY, S. Aus.....	Apr., 1918	J. MCMEIKEN, N. Z.....	Aug., 1917
H. S. YONGUE, Wash.....	Apr., 1918	F. H. GIBBS, S. Aus.....	Aug., 1917
W. WELLSHAVER, N. D.....	Apr., 1918	A. L. PITTINGER, Ill.....	Aug., 1917
W. H. CHIPMAN, Mo.....	Apr., 1918	F. SPINKS, England.....	July, 1917
A. P. STROBEL, N. Y.....	Apr., 1918	J. P. KELLY, Md.....	July, 1917
E. H. ALBERT, Pa.....	Apr., 1918	F. G. STONE, S. Africa.....	July, 1917
J. R. JEFFRIES, Pa.....	Apr., 1918	H. J. DEVONSHIRE, N. Z.....	July, 1917
R. COLVIN, Ind.....	Apr., 1918	V. J. HUBBARD, N. Y.....	July, 1917
J. LIPPERT, Ill.....	Apr., 1918	J. C. SKINNER, Vic.....	July, 1917
OTTO TITTS, S. Africa.....	Apr., 1918	J. M. FRITKINGER, Penn.....	June, 1917
E. N. HARRIS, N. Y.....	Apr., 1918	G. BOBERT, Iowa.....	June, 1917
F. E. SMITH, N. Y.....	Mar., 1918	A. H. MATTHEWS, Mass.....	June, 1917
FLA. AG. & MACH. CO.....	Mar., 1918	BONSTAD BROS., N. D.....	June, 1917
J. V. FINE, Ill.....	Mar., 1918	C. PEALON, Penn.....	June, 1917
H. J. FINEBER, Mich.....	Mar., 1918	A. FARMACHT, Tenn.....	June, 1917
GEO. SMITH, N. Z.....	Mar., 1918	H. A. CHENEY, N. H.....	June, 1917
AUG. HOLMAGEL, Ore.....	Mar., 1918	D. SHAVER, N. Y.....	June, 1917
A. E. UNELING, Wis.....	Mar., 1918	W. R. GELLING, S. Africa.....	June, 1917
J. C. YOUNG, Penn.....	Mar., 1918	J. H. BAKENBERG, S. Africa.....	June, 1917
D. C. HOUCK, Ohio.....	Mar., 1918	A. R. HALLWICK, N. Y.....	June, 1917
JOHN EYRE, Neb.....	Mar., 1918	F. C. BOCK, Neb.....	June, 1917
C. H. STITZ, Tas.....	Feb., 1918	W. PRATT, Iowa.....	June, 1917
A. E. DELANO, Me.....	Feb., 1918	J. P. PRATT, Wis.....	May, 1917
S. J. STAPLES, Ohio.....	Feb., 1918	J. L. HUGHES, S. C.....	May, 1917
J. S. BOYD, Idaho.....	Feb., 1918	C. H. STINER, Ohio.....	May, 1917
J. MOLITOR, Ill.....	Feb., 1918	J. A. STREIBING, Kan.....	May, 1917
F. P. FELLOWES, N. Y.....	Feb., 1918	W. S. SULLIVAN, La.....	May, 1917
J. W. STEADMAN, Ohio.....	Feb., 1918	H. SMITH, Queensland.....	May, 1917
J. P. HOLEAPPEL, Penn.....	Feb., 1918	P. VANDERHAGEN, Mich.....	May, 1917
E. N. GATES, Vic.....	Feb., 1918	YOST & HALVORSON, Minn.....	May, 1917
RENTON WAGON WKS., Wash.....	Feb., 1918	W. MCCOY, Kan.....	May, 1917
WHITING FDY. EQUIP. CO., Ill.....	Feb., 1918	C. F. J. LORENZ, N. Y.....	May, 1917
J. P. KOENIGS, S. Dak.....	Feb., 1918	A. DATWYLER, Ohio.....	May, 1917
RICHARD BRENNER, Tex.....	Feb., 1918	G. WORSTALL, Penn.....	Apr., 1917
W. F. HILL, N. C.....	Feb., 1918	J. SCHAFER, Minn.....	Apr., 1917
O. O. GODFREY, Wis.....	Feb., 1918	O. J. COOK, Cal.....	Apr., 1917
M. C. BETTIS, Tex.....	Jan., 1918	L. BUCHNER, N. Z.....	Apr., 1917
		L. S. KELLER, Md.....	Apr., 1917

The Old and the New

W. O. B.

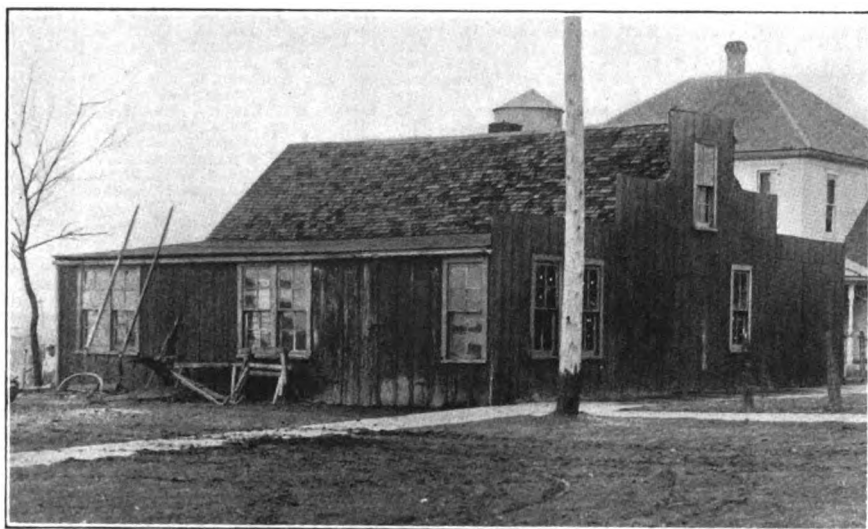
The tendency toward better and more improved conditions in the smithing craft is perhaps nowhere so well illustrated as in the accompanying engravings showing the old and the new shops of Mr. Alf. Seidel of Nebraska. The old shop, as may be

substantial shops. Let us work hard for betterment and improvement all along the line. Let us not rest until every smith shop is a credit to the smithcraft. Let us be dissatisfied with everything but the best. We are continually looking for examples of old and new shops such as Mr. Seidel's. Help us boost by sending in pictures of your new shop. "Bet-

forms in which it has been used for ecclesiastical purposes. It rivals brass for such features as altar standards, screens, grilles, terminals and candlesticks. It was particularly adapted for forming enclosures about ancient tombs of hammered iron work.

The ancient smith enjoyed many advantages over the modern workman, and the productions of his hammer were held in such honor that he could and did afford to give extreme care to their fabrication. His work has been handed down to posterity in many instances. In studying the more elaborate details of antique work, it seems quite clear that not only was it done to carefully prepared drawings but in cases where many pieces of precisely similar shape were used they must have been made to templates previously prepared. Of course, in examining those interesting specimens which are still with us, we have in a great measure to guess at how the thing was arrived at. Still, the method adopted by those mediaeval smiths must have been very much in line with these to which their modern successors find it necessary to have recourse.

In the half-tone illustration of the central door of Litchfield Cathedral is shown the beautiful wrought-iron hinges. The door is in two parts; each half having four hinges. It is just possible that the bishop was the architect for this work. He it must have been who put the design into some master smith's hand with the necessary instructions and directions for the progress of the work. Now, his first operation was undoubtedly to carefully enlarge the design of the



MR. SEIDEL'S OLD SHOP—AN UNINVITING STRUCTURE

seen, was a wooden structure. The new building is of pressed brick with a cement floor. The shop is 38 by 64 feet, with a basement, 24 by 50 feet, devoted to the heating plant, a seven horsepower engine and storage place. A whole car of smithing coal can be put in the fuel bin and a very considerable quantity of wood can be placed in the wood cellar. The shop is wired for electricity, and the machine equipment consists of the regulation smithing necessities, including a drill, plow-sharpener, emery wheels, grindstone and cold tire setter.

Here is shown very aptly the trend of smithing affairs. The shops of yesterday, with their uninviting appearance and rather gloomy and forbidding interiors, are being replaced by solid looking smithing plants that are a pleasure to their owners, a delight to the industrial world and a credit to the craft. It is such shops as Mr. Seidel's that are lifting the craft out of the rut. Such structures tend to create confidence in the craft, and cause the commercial world and the public in general to look upon the smith in a rather credible light.

Let us boost for more of these good

ter Blacksmith Buildings,"—how's that for a slogan?

Wrought-Iron Hinges On Church Door

JOHN Y. DUNLOP

The application of artistic wrought iron in the Gothic period was widely extended, and we have only to look through the many cathedrals throughout England to see the numerous



THE NEW SHOP IS A WELL-BUILT, BRIGHT-APPEARING BUSINESS PLACE



hinges to full size on the drawing board. Thus the exact size of the ornamental work was set out so that the drawing could be referred to all through the job for the sizes and outline. The patterns for the different scrolls were cut out of sheet iron so that the same templates could be used for the reverse sets of curves or clusters, according to the arrangement of the hinges. The metal was then forged out to the necessary width and thickness and the cutting and shaping of the pieces of iron done according to the outline. In making the scrolls the smith probably took a piece of wire and bent it around the edge of the template so as to obtain the exact size. The piece of metal was cut off to the exact length and forged to the true shape and size, after which the workman most likely set about bending the scrolls. This could not be done with one heat, and it was necessary to bend part of the scroll at a time; continuing after repeated reference to the template until the exact sweep and finish of the scroll were obtained. He no doubt made the main part of the hinge in the same way, but, of course, out of thicker and wider metal. On the main stem of the scroll-work were forged the tails for the welding of the main scrolls.

Having completed the various parts of one hinge, ready for welding together, he commenced to weld the small work first, and when this was accomplished joined the smaller scrolls together on the main stem. With the aid of his top and bottom tools all the edges of the junctions were brought into proper shape and the pattern arranged in keeping with the template. Then he set about putting the finishing touches to the job.

The example shown of the wrought-iron hinge is certainly one of the handsomest specimens of a door hinge to be seen in this or any other country. It is a marvel of wrought-iron tracery work of the mediaeval epoch. Its beautiful hues and graceful curves have for long been the admiration of all lovers of real smiths' art.

The smith of the middle age was devoted to the real art of blacksmithing, and very often had to turn his skill to the manufacture of articles of domestic and social utility; giving wonderful expression to the designs of his age.

These designs were the cause of the hammer and anvil being employed to embody and gratify all sorts of superstitious whims and fancies and to illustrate the peculiar allegorical thought and symbolical ideas that were current in those religious times. The result is that almost every ancient church has its collection of wrought-iron antiques in forms suggestive to the pious minded, and numberless revered symbols of the patron saints. Thus the wrought-iron work of the middle age, which is original, has a beauty and elegance

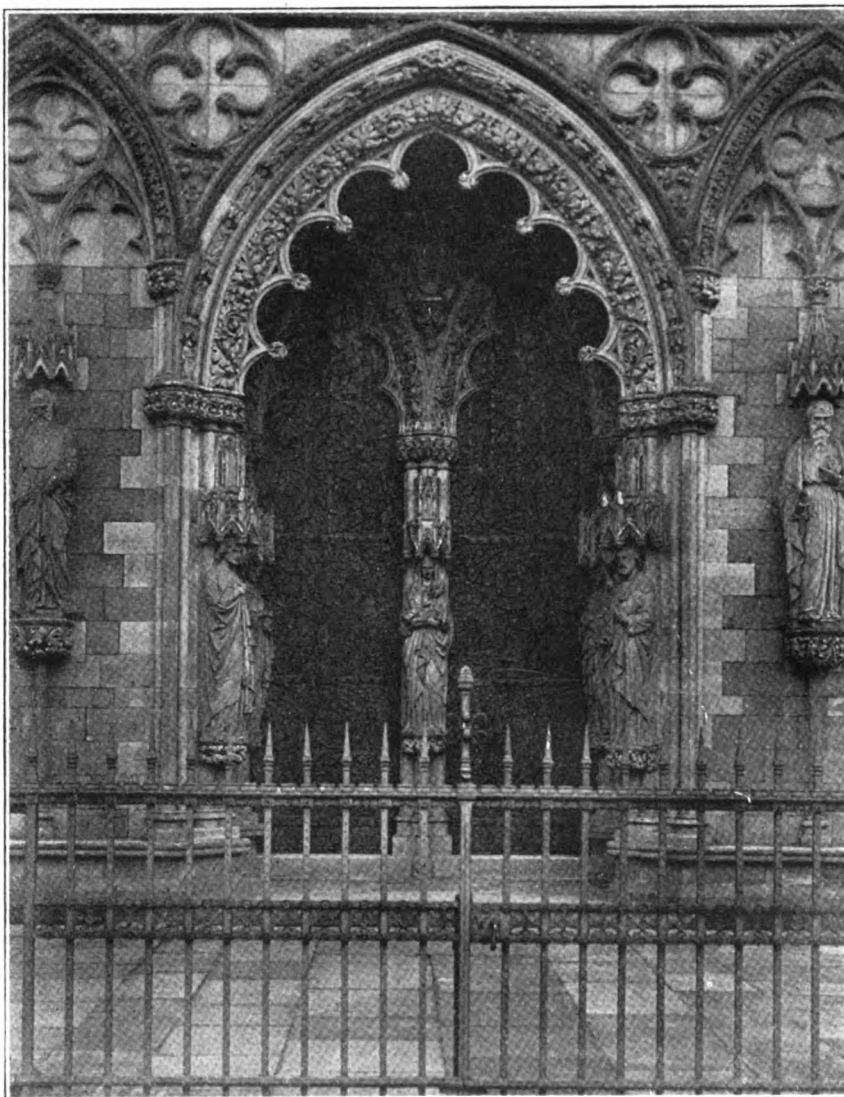
enriched with leaves on the curl and occasionally with animal's heads), to credit our early craftsmen with what is due them; for there is no doubt that the iron forging of our ancestors leaves our modern work hopelessly behind, generally speaking.

Business Mismanagement

By E. ST. ELMO LEWIS

Burroughs Adding Machine Company

Let us analyze the management a moment in its relation to the man on



SOME WROUGHT-IRON WORK ON AN OLD CHURCH DOOR IN ENGLAND

of form which has never been surpassed. And I think that one has only to see the remarkable amount of skill and workmanship in those early English hinges which are ornamented with most elaborate and graceful scroll-work nearly covering the entire door (and this sometimes further

the "other side of the counter", so to speak. I can take any business place, go into it five times and pick ten things in which it is deficient from the standpoint of management, and 99 out of 100 will agree with me whether the management does or not. If you think you are efficient,



you might ask yourself these questions:

1—Do you provide means for using all available knowledge of stock, of the hiring of people, of their proper compensation? If you think you do, how many investigations have you made in other shops in other towns and cities of this country within the past year? How do you know?

2—What provision do you make to see that knowledge furnished your employees is properly utilized? Do you show them how to handle themselves and their work? Do you train them? Do you show them how to do it most efficiently or do you leave it to their individual initiative? How do you know the knowledge is used?

3—As a concrete fact, do you give any rewards in increased compensation to those who do use properly and efficiently the special and concrete knowledge that you give them?

4—Have you anyone in your shop or any department of your shop to whom you provide liberal means for acquiring knowledge?

The results will surprise you (when you have looked yourself square in the eye) after you have made the investigation. Yet, is there one single solitary thing in those four propositions that shouldn't be done—are impractical, unreasonable, that your knowledge (not your opinions) tells you would not work?

There are several reasons for inefficiency in the ordinary shop. I will show you how I go at the proposition, and I am going to give you some little things that happened to me. I will put the most customary ones first.

There are three faults upon the part of the employee. Understand, I do not hold the clerk blameless, but I hold his training to a stricter accounting. Every time I see a poor clerk behind a counter, I look past her—doing the best she can—to that worried individual who sits behind the desk upstairs and is too busy to devote his time to the employment of his help or to their training.

First—There is the lack of interest upon the part of the employees.

I walked into one of our jewelry stores the other day, distinguished for its class or "carriage" trade. Now, I had an idea that I might like to purchase a Christmas present for a member of my family. I went there not to look, but to buy. There was a

man at the repair department, who squinted at me through his goggles as I entered, then went on with his work. Another clerk (the Pompadour Paul style, you know) stood behind the counter, sticking rings into a tray. Understand, he was sticking them in—putting them back into inventory where they don't make anything. He threw me a glance—literally "threw". A couple of young gentlemen of quite superior tonsorial appearance were standing in the rear of the store, holding a chaffing soirée. An older salesman was putting silverware away in a glass case.

I walked over to the gentleman who was sticking rings into the tray and I looked at him quite intently. He never moved an eyelash.

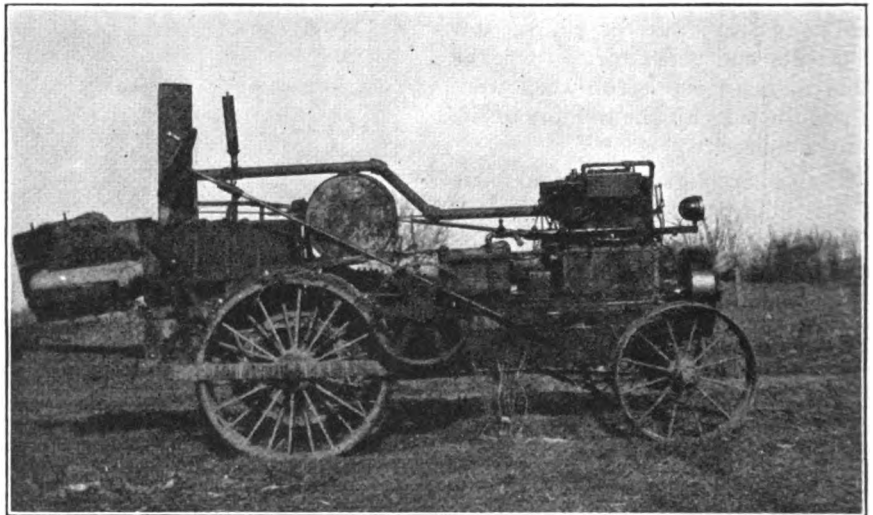
I walked around the case, past the man who was putting silverware away, and I stopped long enough to look at a silver cup. He, too, was considering other very important matters. I went around past the two gentlemen who were discussing the latest tango step and I came up on

pay cash for a purchase that they should be subtly reminded by a frigid indifference that their trade is not considered as good as the charge trade. I do not believe this is one store's real policy, but its clerks are badly trained and, as a class, insufferably discourteous. If the real policy of the store is to prefer credit to cash customers, then it would be enlightening to find why it is wasting thousands of dollars a year advertising in the daily papers. It seems quite absurd for it to carry a line of goods intended to appeal to the middle-class people or to the shopper. And why should it print prices in its advertising?

Third—The next thing is the lack of training of employees.

Employees show in a hundred ways lack of knowledge of stock—lack of knowledge of business procedure—inability to answer ordinary questions about policy.

Fourth—Then there is the one weakness on the part of the business place—lack of attractiveness.



MR. GRIMWOOD'S HOME-MADE TRACTOR

the other side. I passed the watch repair man and went on out the door, and \$45.00 went out with me.

Second—The next fault of the employee is lack of courtesy.

The United Cigar Stores Company have made "thank you," famous from coast to coast. There are a certain number of stores in every town noted for the lack of courtesy of their clerks.

Of course, it really doesn't make any difference except that discourtesy is annoying to people who prefer to

Now, attractiveness is a relative quality. I would suggest that attractiveness of the place is attractiveness for the class of people whom you wish to reach.

Fifth—There is the employer who is satisfied with what he knows himself—what his own experience has taught him. He has an ingrowing mind—an ingrowing business. He dries up and passes away in one generation and sometimes in much less. Let's forget him—he doesn't count.



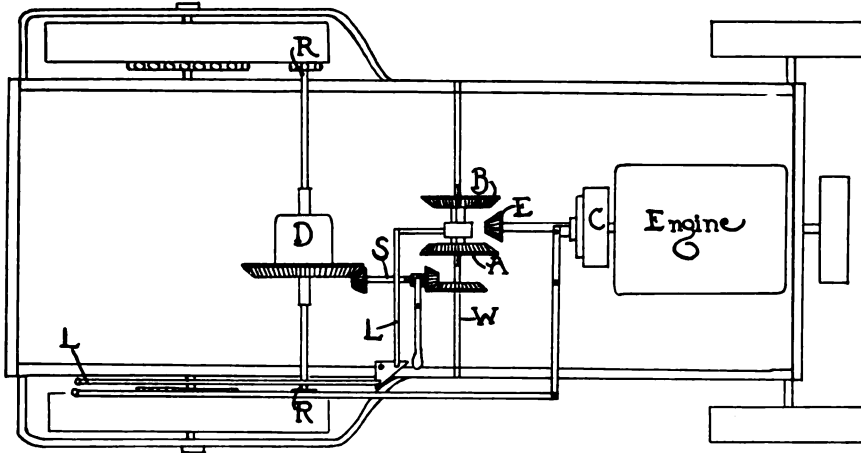
Sixth—Then, there is the employer who fails to apply modern methods.

Modern methods are those which have been tested and tried in the crucible of experience and found successful today. The efficient employer

but they can easily be built cheaper. The engine is what cost me most. It is a Clifton, 2-cylinder, 4-cycle, 14-H. P. engine; running at 400 to 600 R. P. M.

The tractor is 12 feet long and 4½

worm actuating the gear which is attached to the chain. The supply tanks are placed as shown and the ignition is by magneto which is seen just to the left of the motor. The large pipe at the top is from the exhaust into which I have placed the whistle. The draw bar can be seen directly under the seat and is attached firmly to the frame.



PLAN OF MR. GRIMWOOD'S TRACTOR POWER PLANT AND TRANSMISSION

develops the open-minded attitude; he wants outside advice and suggestion; he regularly attends the Business Men's Association Meetings. The inefficient man never goes. If he did, the only thing he would take away from it would be either a headache or a grouch. He is the kind of man who says—"what does he know about smithing? He has never been in the smithing business."

We have at the Burroughs Adding Machine Company a whole department that costs us many, many thousands of dollars a year that doesn't do anything but make researches among the people who use our product and among those who do not; in order to find out the best way of using it, so that we may get other people to use it in the same way, and to find out what sort of machines we must make to meet tomorrow's demand. That is our Business Insurance Department.

Why not such a department in the shop?

Think it over!

A Home-Made Farm Tractor

H. A. GRIMWOOD

The halftone on the opposite page gives a side elevation of the tractor I recently built. It is not a hard matter to build a machine, but requires a man who can go about it in the right way. This machine cost me \$800,

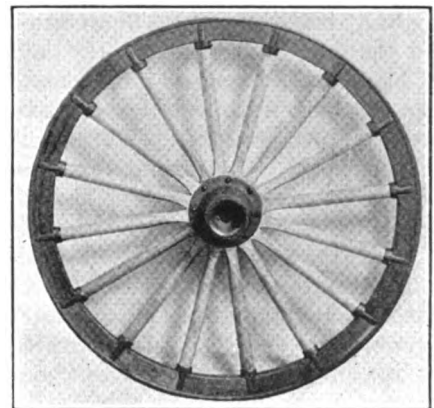
feet wide. The frame and wheels I bought piecemeal and assembled myself. The front wheels are 28 inches in diameter with a 7-inch face; back wheels, 36 inches in diameter with a 9-inch face. The drive to the rear wheels is by two roller chains—one on each side from a differential shaft—as seen at R, in the engraving. This shaft contains the differential gear, D, of which I bought the parts and made it up. It is constructed in the ordinary way, and the crown gear that drives the differential housing is meshed to the pinion on the shaft, S, which is driven by the shaft, W. The pinion on the end of this shaft, S, can be thrown in and out of mesh with W. The shaft, W, is then free and is used for stationary work. This shaft, W, contains the forward and backward gears, A and B, which are fastened together in the center and are shifted sideways with a rod into the gear, E. The shaft here is square, of course, and when A meshes with E, the tractor is driven forward; while when B meshes it goes backward. The control is by an arm, and is moved by the lever, LL, from the seat. The gear, E, is direct-connected to the engine shaft that holds the clutch, C, which is also operated from the seat as shown. This completes the transmission, which is the most difficult part of a tractor to construct.

The steering gear is plainly shown in the half-tone. It consists of a steering column and wheel, and the

A New Wheel With Segment Rim

The engraving pictures a new wheel known as the "crown and segment rim wheel." As shown, its construction is distinctly different from any wheel now in use, though this new wheel retains the good features of the well-known Sarven hub.

This new style wheel differs from the usual wheel construction of the present, in that instead of the usual mortise and tenon joint between spoke end and rim, the new wheel spoke end is fitted with what is called a "crown." This is a malleable casting into which the spoke end is fitted. This "crown" is shaped as shown in the engraving at Fig. 3 (next page); each "crown" supporting the ends of



A NEW WOOD WHEEL WITH SEGMENT RIM

two rim segments or sections. When the tire is placed on this wheel, the rim sections are forced to a solid bearing on the shoulders of the crown fittings. The crown, on the other hand, is forced down onto the end of the spoke, to a solid bearing. There are no tenons cut on the spokes nor are there any mortises in the rim.

In the manufacture of this wheel, the rim segments or sections are so gauged as to thickness as to allow just sufficient compression of the rim to



allow the tire to touch the web of the crown when the tire has been properly set. This is illustrated in Fig. 2, which shows a pair of spokes fitted with their respective crowns and a rim segment. In this engraving, it will be noted that the rim segment extends somewhat beyond the top edge of the crown fitting. In Fig. 1, however, the tire is shown tight and solid, and just touching the top of the crown fitting. The rim sections are held solidly under pressure by the tire, and thus the need of tire bolts is obviated.

These wheels have been thoroughly tested in actual service for a period of six years, and are said to have stood up well. In fact, the inventor claims that some 250 sets are still running after six years.

The new wheel will be manufactured by the new Wapakoneta Wheel Company of Wapakoneta, Ohio, though crown fittings will be supplied those who desire to make their own wheels in this new style.

Good Roads and What They Are Doing

The building of good roads is the one biggest and most important factor which this country must consider in the next few years. The improved highway is the one means of salvation for the poor man; for in these days of high cost of living we must look to the cheaper transportation of foodstuffs as our way out. We can no longer expect to better our condition through a greater supply of necessities; for every effort we have made toward lowering the cost of foodstuffs, heretofore, has been met with the response that the United States is now about as intensively cultivated as it can be. In other words, our people are no longer turning to the country in an effort to produce a larger amount of food. Therefore, we must face the problem of getting along with the same amount that is now produced.

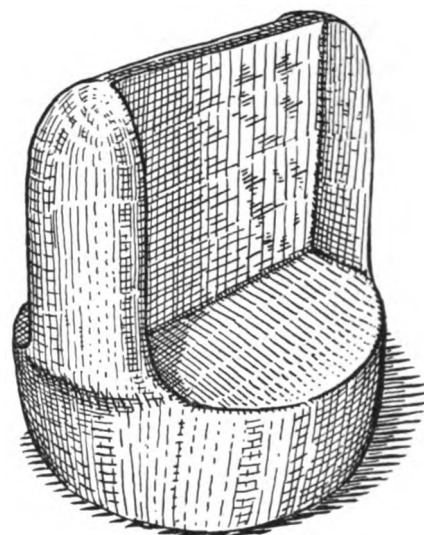
The only solution left for us is to cut our cost of production and delivery. The best way to accomplish this is to provide good roads; for we have already had many demonstrations of how good roads will work to our advantage.

The improvement of highways in many parts of our country in the last few years has invariably been followed by better living conditions.

Where the roads leading into a large city have been improved, we have seen an increased supply of food stuffs on the local markets and a larger number of farmers bringing their products into the city. This, of necessity, results in lower prices for the products and a long step toward better living conditions.

On the other hand, the improvement of roads throughout the country is invariably followed by an improvement in farming methods. The agriculturist who heretofore devoted his energies to grazing and the production of rough foodstuffs, such as corn, is now turning to what is known as market gardening. He is raising potatoes, beans, peas and other commodities that are in every-day demand, simply because he can get them to market where heretofore markets were denied him. It is no uncommon sight now to see farmers driving eighteen or twenty miles to market with loads of produce which, before the highways were improved, were denied the consumer. The automobile, it is true, has had a great deal to do with increasing this supply, but even this vehicle would be helpless without highways on which to run.

The advent of good roads, too, has brought about another revolu-

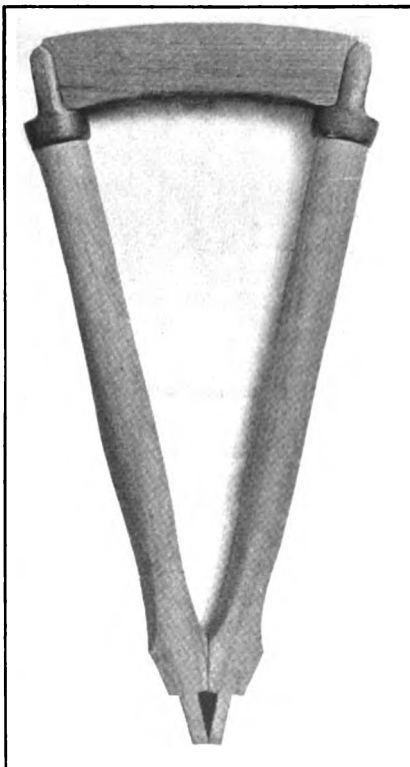


THE MALLEABLE CROWN USED ON NEW WHEEL

tion—that of intensive farming. The countries of the old world have always regarded us as a criminally wasteful people, in that the product raised on one hundred acres of land in this country was often less than they produced on ten acres. Good roads have changed this condition. The American farmer now finds that he will get a greater return from one acre of land intensively cultivated than ten acres farmed in the old slipshod methods would heretofore produce. This intensive farming is the direct result of good roads; for where the farmer heretofore found it necessary to cultivate crops which made a large bulk, so that his infrequent trips to market were profitable, he now finds that he can take a small load to the consumer as often as he desires.

Good roads are an unmitigated blessing, and this every one who has given the matter any thought will admit. They not only promote increased industrial activity, and therefore better the living conditions of thousands of our city dwellers, but they provide an improved social life for people who live in the country. The family which has access to a good road, and therefore quicker and more pleasant trips, goes to church oftener, visits the neighbors oftener and attends club meetings more frequently.

And who will say that all of this has not benefited the blacksmith? Whether he is a specialist in shoeing or a general worker, the smith is vitally interested in good roads, and their construction means better business generally.



A SECTION OF THE NEW WHEEL



Electroplating: Theory and Practice—2

E. V. S.

Practice Equipment: The Tank

The most important requisite in the electroplating outfit is, of course, the plating tank. Fig. 4 shows a home-made plating tank; this is made by cementing glass plates and enclosing them in the wooden box. The box should be strong, well-made and is best of mortised or rabbeted joints. The cement may be either marine glue, which can be bought, or two parts of pitch and one part of guttapercha melted together. Some of the melted material is poured into the wooden box and spread in a thin layer over the bottom with a warm iron. While the cement is warm (not hot), press the bottom plate firmly into it. The sides are treated in the

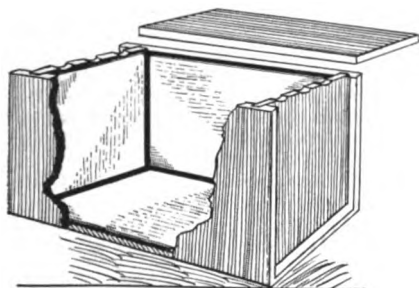


FIG. 4—A GLASS-LINED PLATING TANK

same way, but before putting in the glass plates, warm them gently and coat all the edges with a thin layer of cement; so that when they are pressed together, the surfaces will adhere thoroughly; the joints will then be waterproof. Have the box slightly longer than the plates, to allow for expansion. In a large tank more than a single plate can be used to a side. If the tank is large enough, it should be set on legs—it should be elevated from the ground, anyway. A cover should be made to keep out dust and dirt, and left on all the time except when placing in or taking out articles.

Test the tank carefully for leaks, and see that it is plumb and steady, and will not be disturbed by jostling the supports. Three pieces of brass pipe, $\frac{1}{4}$ or $\frac{3}{8}$ inch inside diameter and stiff enough to hold the anodes and articles to be plated, are procured for each tank. These pipes are set in the grooves and connected with

copper wire, carefully soldered, as in Fig. 5. The wire should not be wrapped about the ends of the rods, as they are liable to loosen and fill with dirt. On the rods marked "anode" are hung the plates composed of the metal to be dissolved by the action of the electric current, and on

the parts together. The partition in the center is to divide the water which runs through the hole. The shelf is set on cleats six inches from top of trough.

All metal castings, forgings, etc., are immersed in a hot solution of caustic potash to loosen and remove

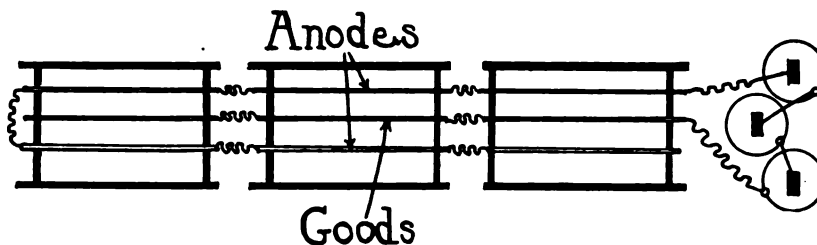


FIG. 5—PLAN VIEW SHOWING TANK ARRANGEMENT AND BATTERY AND ROD WIRING

the negative rod (marked "goods") are suspended, by hooks of No. 8-gauge copper wire, the goods to be plated. These tanks should never be left empty nor should the solutions be allowed to get foul. If only one tank is to be used at a certain time, only that tank should be connected up and, of course, the current proportionately regulated.

Scouring Trough and Cleaning Tanks

The scouring or scrubbing trough (shown at Fig. 6) may be made large or small, according to the class of work. It is best constructed of heavy dressed plank, well matched and jointed. The interior is painted with prepared asphaltum, or lined with lead, the seams of which are wiped and not soldered. This is necessary, because of the strong potash solution used. The bottom and sides are rabbeted and the front side beveled to the required angle. The bottom is set into the sides, not sides onto the bottom. The joints are fitted tightly with white lead. Large wood screws, not nails, are used in putting

grease and oil. The solution for this purpose is contained in a wrought-iron tank. This solution is to be used hot, and the tank must be placed where it can be conveniently heated, either by steam or by a coil of iron pipe in the solution, or by an ordinary furnace, or by gas or oil. This solution is composed of American potash dissolved in water at the strength of one pound to each gallon of water.

Another tank, containing hot water, is placed near the potash for rinsing. It is of the same material and construction and is supplied with clean hot water.

We advise the purchase of all plating, scouring, cleaning, etc., tanks; as when they are home-made, leaks, cracks and warpings occur with disheartening frequency and, besides losing valuable time, the solutions themselves are lost; deluging the shop and ruining many things. The makers are specialists in this work, and give due consideration to the selection of the wood, iron, etc., and perfect their construction to the best of their ability. On the other

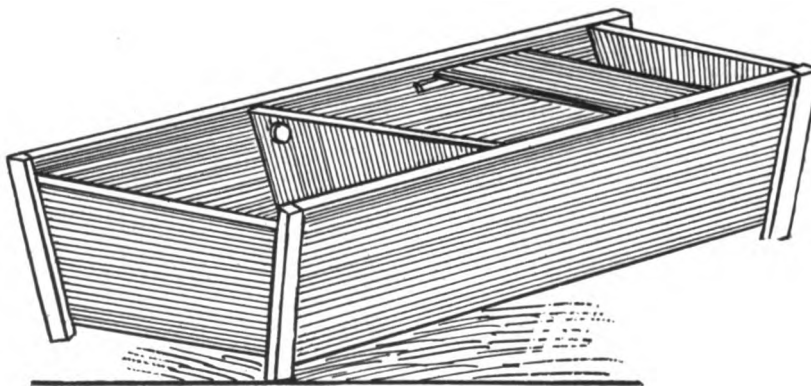


FIG. 6—SHOWING THE SCOURING OR SCRUBBING TROUGH



hand, it is best to feel your way cautiously when entering a new and untried field, and the home-made articles will do nicely for a safe beginning. Cast-iron kettles may be used in lieu of the wrought-iron tanks. If the solutions are heated in the forge fire, exceptional care must be observed in keeping the fire smokeless and sootless—a deep, hot, bed of coals. (We do not advise using the forge directly—steam is better.)

(To be continued)



Queries— Answers— Notes

"Seeded Toe."—Can any of the brothers give me any information regarding a foot that grows long at the toe? It grows out and turns up and is sort of stringy. It is what I call seeded toe. The mule walks on his heels, mostly, and these sometimes get sore and he can hardly go. If shod with a chisel calk he can go better, but I would like to know if there is a remedy for this trouble. I will appreciate hearing from some of our readers on the subject.

T. R. WOMBLE, Georgia.

For Users of Calking Machines.—As I have never used or seen a calking machine in operation I would like to hear from those who have used them. Does the machine finish the job or is there considerable handwork to do on a shoe after it has been through the machine? I would be pleased to hear something on this subject through the columns of the paper. Also, can the regulation foot vise be dispensed with entirely for sharp-shoeing when one has a calking machine. LUKE BLABEY, Canada.

How to Temper Bear Trap Springs.—In reply to Mr. M. F. Geraghty's query on tempering bear trap springs, I would suggest that he take a vat large enough to hold the spring. Then melt enough tallow to cover the spring (just have it soft, not hot). Heat spring to a cherry red and dip it in; let cool in tallow and flash off three times. He will find that if his steel is good he will have a good live spring. I never fail when steel is good. I temper all my springs this way and don't have any trouble at all.

T. R. WOMBLE, Georgia.

A Shop-Made Tractor.—In renewing my subscription for the tenth time (for the paper I would not be without, because of the valuable assistance it has been to me), I am enclosing a photograph of a small tractor of my own invention and which I put up in my own shop. The picture prac-

tically explains itself. It has a mower attachment, also a plow attachment. It mows from 18 to 20 acres a day and plows from 10 to 12 acres a day with a gang plow of three 12-inch bottoms. It is very light in weight and can be run over plowed ground without packing it.

FRED STACK, Colorado.

A Word from Queensland.—Here we make all sorts of vehicles from goat carts to wool wagons with 6-inch tires and 3½-inch axles, as well as motor cars. The wages in this city are not as high as out West or further North. The wages for a blacksmith or wheelwright range from 48s. (\$11.68) to 66s. (\$16.06) per week. In foundries, however, better wages are received for heavy work. Naturally, I know quite a little about blacksmithing and give much advice to those working in our shop. However, I do not forget that although I have had 49 years' experience as a blacksmith, I have still much to learn. In my opinion, a man never becomes perfect in his profession or trade. He must forever endeavor to keep abreast of the times in the march of progress and, as a means to that end, "Our Journal," in bringing new methods to the notice of your subscribers, is undoubtedly unsurpassed. I for one consider blacksmithing the profession of professions, although such remarks as "Oh! he is only a blacksmith" may occasionally be heard.

W. H. THUGE, Australia.

Foundering and Overreaching.—In reply to Mr. V. J. Hildreth's query requesting information on foundered feet, I would say that I do not believe there is a cure for feet in this condition. The only remedy I resort to is to apply shoes as comfortable as possible, to allow the animal to work on the land or to do slow work on good roads. In shoeing, no calks of any kind should be used. Lower the heel to get a good bearing. A plain flat shoe, thin toe and heel rocker style, narrow in bearing except at heel. Bars, pads and the like are not beneficial. Let the natural frog come to the ground, and allow it to perform its own natural functions. Horses shod in this way, although deformed, will do a large amount of work. Use small nails and keep them from the toe—the seat of the trouble.

Mr. E. Troyke, Illinois, wants a remedy for overreaching. This trouble is generally met with in young horses that are not in working condition, and horses with poorly

constructed limbs. In shoeing, use light, flat shoes all around. Don't lower the heels too much in front, to assist breaking over; and keep heels low behind, to hinder same. Clip on side behind, round the toe and set under. THOS. NORTHWOOD, England.

Some Electric-Blower Hints

The following hints and suggestions are made by a large maker of blowers:

Many smiths make the mistake of covering up the motor with a heavy cloth or canvas. We advise against this practice as it is responsible for many a burnt-out armature. While it is well to protect the motor from dust with some sort of cover it is still more important to see that the motor *does not become overheated*; a cloth, of course, keeps the heat in the motor instead of allowing it to escape.

An excellent arrangement is to place a small box over the entire blower, first removing a couple of boards from the sides of the box to allow free circulation of air around the motor. This keeps out most of the dust and sparks and at the same time the motor is kept from overheating.

An almost solid motor casing without many openings or perforations is an advantage in a forge blower motor, as it prevents metallic dust from entering the windings and breaking down the insulation.

In all forge shops, the layer of dust which soon covers everything is of a greasy consistency; this acts as an insulator on the motor casing and should therefore be wiped off once a week.

A blower of small diameter to produce the necessary amount of blast must run much faster than one of large diameter. High speed means high friction, short life, high power consumption.

Four tips on electric blowers may therefore briefly be summarized as follows:

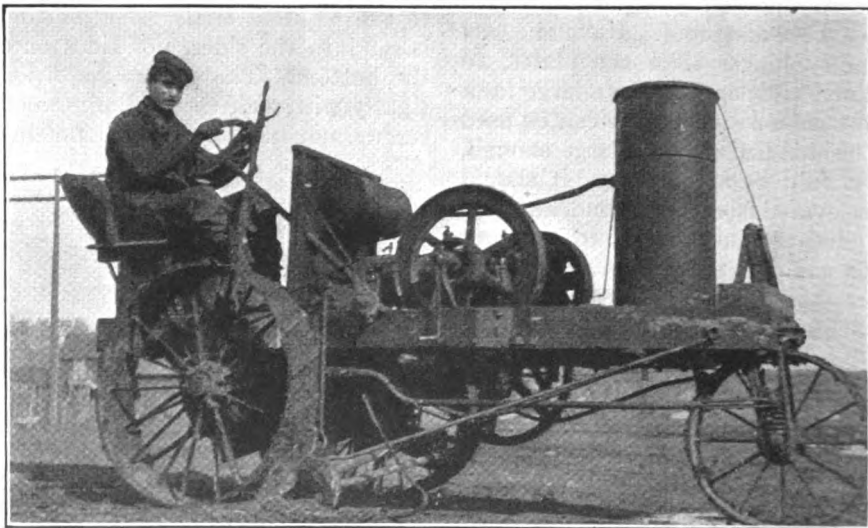
Tip No. 1—Do not cover the motor with any kind of cloth or canvas. Use a wooden box instead.

Tip No. 2—Wipe dust and grease off motor at least once a week.

Tip No. 3—Choose a blower with well-enclosed casing, protecting against metallic dust.

Tip No. 4—Get the largest blower and motor that is obtainable.

The best way of installing an electric blower is directly behind the forge, level with tuyere, the speed regulator being hung where most convenient to reach.



THE GASOLINE TRACTOR BUILT BY MR. FRED STACK IS OF COMPARATIVELY LIGHT WEIGHT



The Automobile Repairman

Remedying Loose Automobile Fenders.

A number of automobiles, more especially the lower-priced ones, have fenders that will become loose and rattle after a little service. Some of the noise is due to loosened bolts and may be remedied by tightening up the nuts. Another cause for the rattling is that the rivet holes are worn large. This is usually found on the lower rear braces supporting the fenders over the rear wheels. The action of the chains and mud slinging is very apt to loosen the thin sheet metal from its fastening, and once started, the hole enlarges rapidly. Sometimes a larger size of rivet will suffice. When the hole becomes too large for these repairs, a new fender will be required or the old one must be patched. The patching is usually unsightly. Frequently a large washer with a hole for a $\frac{1}{4}$ or $\frac{3}{8}$ -inch rivet can be used over the tear and, if riveted down tightly, it will last quite well. If the edge of the washer is well tapered, this repair will not be noticeable after the entire fender has been painted over.

When about to inflate a tire always give a few strokes of the pump before attaching it to the valves, in order to blow out any grit.

Camphor in Gasoline. A great deal is being published in the automobile press regarding the use of gum camphor in about the proportion of one ounce to five gallons of gasoline, and the assertion is made that mileage per gallon can thus be greatly increased. A foreign publication goes so far as to claim that one motorist increased his mileage twenty per cent.

We are very skeptical indeed regarding the benefits to be derived from the use of camphor in gasoline. The sales manager of a large automobile concern emphatically states that after exhaustive experiments no benefit whatever was derived from the use of camphor in gasoline when used as fuel.

Handling Gasoline and Lubricating Oils

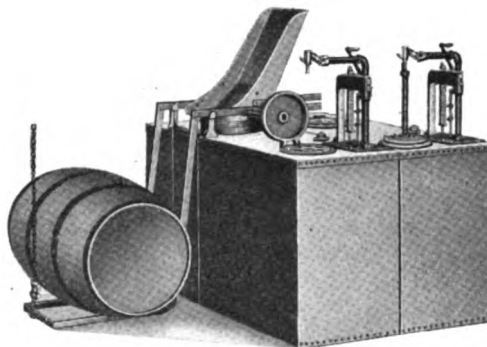
G. A. TOWNSEND

What is more natural to the farmer, townsman, merchant, storekeeper, etc., when any metal breaks, than to go to the nearest blacksmith to have it repaired? For generations, every member of the family has been

trained to look on the blacksmith as the natural repair man of the neighborhood. When the tire of the wagon needed shrinking, the horses shoeing, a stay-rod on the hay wagon welded, a bolt was broken in the reaper, it was always a trip to the blacksmith for the needed repairs.

Now, for some reason or other, possibly because their attention has not been forcibly called to it, some blacksmiths are missing a big opportunity for securing part of the automobile trade. The average family has long been educated, as above stated, to come to his place for anything that enabled a vehicle to go, and all that was needed by the blacksmith was to study automobile mechanism a little, find out just what was wanted and then cater to the autoist's needs, as this great business came into its own. It isn't too late to get part of this profitable trade at this time. The grocer, druggist and general merchant have availed themselves of this opportunity, and today are reaping a harvest of extra dimes of profit that should by force of habit gravitate to you.

Now, it isn't necessary for the average blacksmith to start a full-sized repair shop with lathes, tools, etc., or keep all classes of automobile accessory supplies on hand. He can make an excellent bid for the business



Courtesy S. F. Bowser & Co.

LUBRICATING OIL TANKS WITH SELF-MEASURING PUMPS AND DEVICE FOR EMPTYING BARRELS

will quickly resume the habit of long ago, in coming to the blacksmith shop for anything and everything for the automobile as he did when he drove horses only.

There isn't anything about an automobile that any blacksmith couldn't master if he had a mind to do it. The only complication probably would be the electrical end of the machine. Even this is not difficult. It only seems so because of inexperience.

Vulcanizing is child's play, but the average motorist would rather have this work done than do it himself. Now, supposing the blacksmith has a desirable location (and nearly every smithy is in such a position in every town), the first move is to install an outside gasoline self-measuring pump that is a standing advertisement and invitation for every passing autoist to stop and fill up his car. This is a sign known by every autoist and recognized as a friend. Inside, suitable lubricating oil storage should be installed, so as to furnish the proper grade of lubricant. He can find out what is most universally used in the neighborhood, so he will have no difficulty in supplying the right kind. The best is the cheapest in the long run.



Courtesy S. F. Bowser & Co.

GASOLINE FILLING STATION FOR THE GARAGE-SMITHY

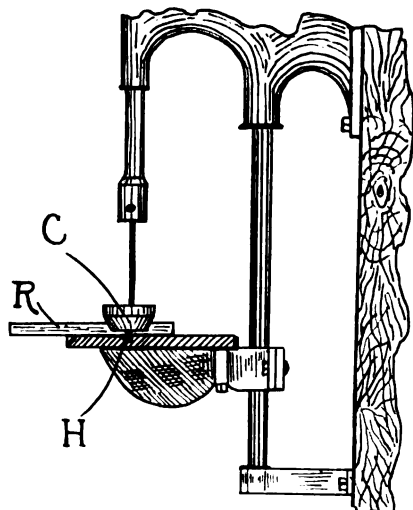
by establishing gasoline and lubricating oil filling stations. It is only a step from this point to repairs, and the result will be that the autoist

In connection with the lubricant it is advisable to have at least two storage tanks, one for the autoist and the other for the needs of the farmer.



When the farmer comes in for repairs he usually needs oil for the reaper, mower and other farm machinery. This isn't as high a grade lubricant as the autoist requires, but carries with it a comfortable profit. When properly stored and handled there is absolutely no waste of any kind.

Now, supposing for illustration we take an average town of 3,000 inhabitants. Every one in the town and outside, within a radius of from three to five miles, knows the location of the shop. In this day and age, when automobiles are a necessity to the many rather than a luxury to the few, there will be a sufficient number of "buzz wagons" in such a territory to warrant the smith in establishing a gasoline and lubricating oil filling station as a starter toward securing his rightful share of the autoist's trade.



HOW A CONE WAS TURNED ON A DRILL

There are any number of styles of equipment on the market, but for this particular case we would recommend a gallon self-measuring pump with a five-barrel underground storage tank. This will take care of the gasoline in the most improved and approved manner. It will advertise your business, bring new trade and a greater profit. It is a step in the right direction. This is equally as practical for the country blacksmith, especially if located on one of the main roads. Many transient tourists will stop to "fill up" as well as the farmer who calls for repairs to machinery.

This pump is sold standard with a discharge register, gallon meter, lock, hose, portable nozzle and a wonderful centrifugal filter. The discharge

register records the number of gallons pumped when filling the reservoir of a car. The gallon meter accurately records every drop of gasoline drawn through the pump, up to 10,000 gallons and then repeats. The filter does away with the use of all chamois-lined funnels and positively eliminates all water and impurities from the liquid.

This pump is also equipped with a computer which works on the same principle as a computing scale. It enables the owner to charge the customer with the exact amount for the gasoline purchased. It doesn't matter at what price you are selling gasoline, per gallon, the computer is graduated properly and accurately. Such an arrangement permits the selling of small quantities of gasoline to users in the neighborhood for household purposes. It is a very profitable end of the business when you can tell to the fraction of a cent the amount sold.

Inside the shop we would advise putting two lubricating tanks similar to those illustrated. Each one holds sixty-five gallons or more, and shows at a glance approximately the amount of oil on hand at any time. The self-measuring pump gives correct quantities as the oil is drawn. There can be no waste, and the owner should sell all the oil he buys. There is no guesswork as to results and, when equipped with a lock, no one but the possessor of the key can get the oil.

A blacksmith shop equipped as above specified has made a most advanced step in bidding for the motorist's business. There isn't a better spending class in the world than the autoist. A man with a machine is uplifted, taken out of the ordinary rut of every-day life, and the exhilaration of running makes him an optimist rather than a pessimist. You never knew an optimist who was a miser.

How We Turned a Cone Without a Lathe

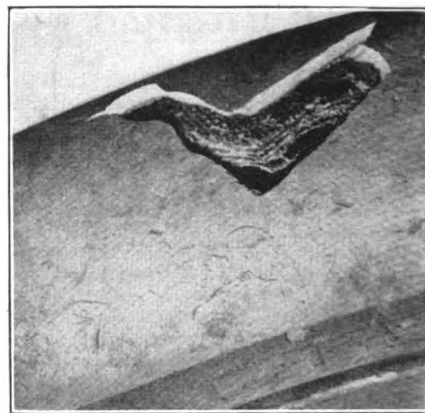
L. R. SWARTZ

The cone in the ballbearing at the outer end of the front axle on a chain-drive Rambler Car of 1905 was broken, and the man wondered if we could forge and file one into shape, as it would take considerable time to get one from the manufacturer. I suggested that we endeavor to turn a

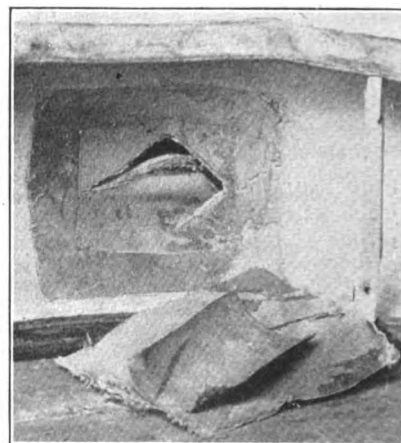
new one. He could see there was no lathe in the shop and smiled.

I got a piece of steel shafting, larger and longer than the cone, that had a $\frac{1}{2}$ -inch hole bored in it endwise. I ran a $\frac{3}{8}$ -inch bit into the center of the rest plate of the drill press, as shown at H in the engraving. This hole was only run in about $\frac{3}{8}$ of an inch. Then I cut off a piece of $\frac{1}{2}$ -inch steel rod and fitted it in the drill chuck and turned the point to fit the $\frac{3}{8}$ -inch hole.

I next cut a hollow groove along the $\frac{3}{8}$ -inch rod and inside the hole in the piece of shafting. I drove the



A



B

FIG. 5—A CASING BLOWOUT AND HOW IT IS PREPARED FOR FILLING

shafting on the rod and keyed them together with a piece of the tang of a small file. Then I fitted the rod into the chuck, and the turned point in the hole, H, and tightened everything securely. Next I clamped a piece of square bar iron (R in the engraving) to the plate for a tool rest. I ground a couple of lathe tools which I had, and while a friend turned the drill crank backward I turned the cone to size and taper of the old one,



Vulcanizing: the How, the Why and the Wherefore*—3

E. V. S.

Casing Blowouts

Fig. 5, A (preceding page), shows a typical blowout in the tread of a casing. This is repaired by what is known as the wrapped tread method. No two repairs are alike, but the general method of treatment is always the same.

Have the tire absolutely dry before beginning work. Moisture in the canvas will form steam when heat is applied, and force the layers apart; making a weak, spongy repair. If a thin layer of canvas covers the inside of the casing it should be removed from clincher to clincher, i. e., from one side of the tire to the other and for a distance of at least four inches on each side of the blowout. In case the inside layer is of thick, strong material it may be left in place and cleaned thoroughly with gasoline and sandpaper. Also clean the edges of the cut and at least half an inch around the cut on the outside of the casing.

Remove any loose canvas that may be around the blowout, on the *inside*; cutting it out in steps (as at B in Fig. 5). Coat all over with cement; working the cement in between the plies of fabric at the ragged edges of the damaged part. After first coat has dried for an hour or two put on another coat and let it stand for several hours—over night if convenient. The idea is to insure the evaporation of the gasoline in the cement, or it will have the same effect as if the tire were not thoroughly dry, and would make a poor repair.

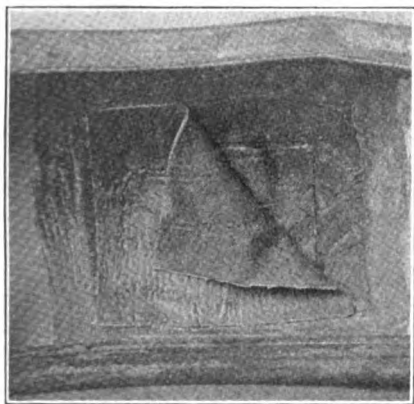
Cut layers of blowout canvas (Para-coated on both sides) to fit the steps from which the fabric has been removed, and work them thoroughly into place, one at a time (as shown at C in Fig. 6). Roll from the center (see D) to the edges of the patch, and if air bubbles form under the canvas prick them with an awl and roll them flat, as it is necessary that the canvas be laid smoothly and that perfect contact be secured between the different layers. Then put on another patch an inch larger

all around than the largest step; finishing with plain friction canvas, or canvas Para-coated on one side; the last layer being long enough to entirely cover the preceding patches and reach an inch or two beyond the clincher (illustrated at E in Fig. 7).

If the cut is a clean one and the canvas around it is sound, it is not necessary to cut away as directed above, and the first layer may be applied directly to the inside of the casing, so that it will extend at least an inch and a half all around the hole. Then step up as before; using enough layers of canvas to give the required strength.

Friction canvas may be used for the entire repair; alternating layers of canvas and layers of thin Para rubber. Cement is not then necessary between the layers.

Dust the inside of casing with powdered soapstone and place on inside form of vulcanizer (as in F Fig. 7); filling hole on outside with Para rubber, not quite even with surface. Pack this in firmly, so that there is no chance for air to be trapped in the bottom of the hole. Cover the repair with waxed paper;



C



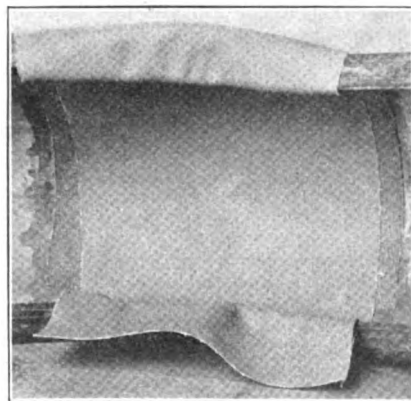
D

FIG. 6—HOW THE PATCHES ARE APPLIED AND ROLLED INTO PLACE

as at C, finishing with a file and emery cloth.

In measuring the broken cone I found that a $\frac{1}{2}$ -inch pipe tap was a close fit in diameter of screw and number of thread; but to save cutting down the screw and making a new jam nut I made a tap and cut it over size with a $\frac{1}{2}$ -inch pipe thread, tempered it and reamed the hole in the new cone with a long fluted reamer until I could start the tap and cut the thread to fit the screw on the end of the axle. I then cut the cone to proper length with the hack saw, also cut the wrench holes with hack saw and finished with file and emery cloth. The shafting was hard and tough, and I did not find it necessary to temper the cone. It is as good today as when it was first made.

Many light jobs of turned work can be done on a drill press if one goes after it right. A great many auto threads so nearly match the smaller sizes of pipe threads that small pipe tools may be used in making these repairs if the dies are adjustable.



E



F

FIG. 7—AFTER APPLYING THE INSIDE FINISHING STRIP, THE TIRE IS PLACED ON MANDREL

* Photographs by courtesy of Shaler Co., Waukegan, Wis.



then holding tension clamp underneath, and placing the rubber bead strips in groove along beads (as illustrated in G in Fig. 8), begin at one end and wrap tightly with binding tape; making each turn overlap the preceding by half its width. Fasten end so that it cannot unwrap, and tighten tension screws until casing is drawn firmly into contact with the heater (inside form). While wrapping, mark the location of the repair on the outside of tape (H in Fig. 8), so that when the outside heater is put on, you can set it exactly over the repair.

Clamp outside heater firmly, but not tightly, over the repair. The tape gives plenty of pressure. Don't try to make the outside heater exactly fit the curvature of the tire. The casing ready for vulcanizing is shown in Fig. 2. Now cover with a piece of carpet or an old coat, to retain the heat, and vulcanize from forty minutes to an hour; depending upon the size and thickness of the repair.

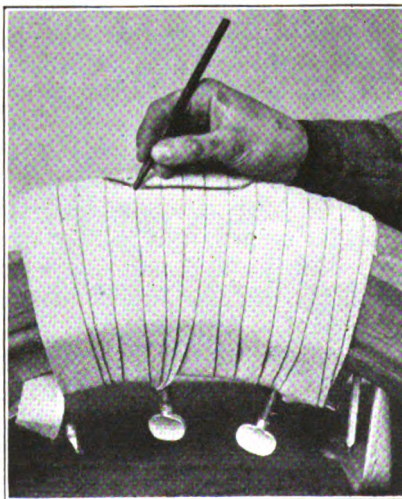
After removing tire from vulcanizer, clean the projecting canvas as well as the parts of the bead adjacent to it and give each a coating of common patching cement—vulcanizing cement has no adhesive qualities. Then fasten the canvas in place and cut off any excess.

This wrapped tread method is very simple for anyone to use intelligently, besides having other advantages. As the reinforcement is all applied to the inside of the tire, it is unnecessary to cut away and replace a lot of sound tread rubber. Moreover, the method of building up the repair does not detract from the strength of the tire by leaving weak spots at the ends of the repair. A repair of this sort can actually be made stronger than the remainder of the tire. The appearance of the finished repair affords a strong contrast to the usual unsightly sectional repair. Nothing is visible from the outside except the plug of new rubber that fills the hole through the tread. This leaves but a small surface of the repair subjected to road wear. Advantage lies with the wrapped tread method in economy of material and, also, the small area of contact between tire and repair offers but little chance for the repairman to make a poor weld. The time required in vulcanizing or curing is important.

To vulcanize a layer of Para $\frac{1}{16}$ of an inch thick it takes from fifteen to twenty minutes if the thermometer is kept at 265°, and five additional minutes for each additional sixteenth of an inch. Vulcanization will occur equally well at all temperatures between 250° and 275°. The lower



G



H

FIG. 8—THE TIRE IS THEN WRAPPED PREPARATORY TO VULCANIZING

temperatures require more and the higher temperatures less time than that stated above.

We append here some pertinent pointers for perfect repairs:

Always use a sheet of waxed paper between vulcanizer and tire,

to prevent repair from sticking to the hot iron.

It is not necessary to cut away a lot of good rubber when mending small casing cuts. Leave everything except small shreds that cannot be incorporated in the repair. When cutting rubber, wet the knife, and the work will go easier.

If a cemented or acid-cured patch has covered the point of repair, it must be removed and all traces of the cement cleaned from the tube. A common spring bottom oil-can, filled with gasoline, and an old tooth-brush are handy for cleaning repairs.

When mending small casing cuts, it is better to use small scraps of Para than to try to cut layers to fit the hole. All air bubbles that appear when adding layers of Para to fill up a cut must be punctured with an awl and pressed down flat. Don't rush the work. A few extra minutes spent in preparing a repair and vulcanizing it may save considerable trouble later.

When properly cured, a repair should not retain an indentation made by the fingernail. The longer a repair is vulcanized, and the higher the temperature maintained, the harder the patch becomes. If a patch simply seems too soft, apply the vulcanizer a few minutes longer. In case it seems necessary to increase the cure, it is better to add to the time than to the temperature. Under-curing is always preferable to over-curing.

If a poor patch is made, it is best to remove it entirely; recoating the hole with cement, and filling with fresh Para. A porous patch is caused by a damp tire, failure to let the gasoline evaporate after cleaning the tire, to let the cement dry, or by air-pockets between the layers of Para. It may also be caused by too high a temperature. The latter cause makes a patch hard and brittle.

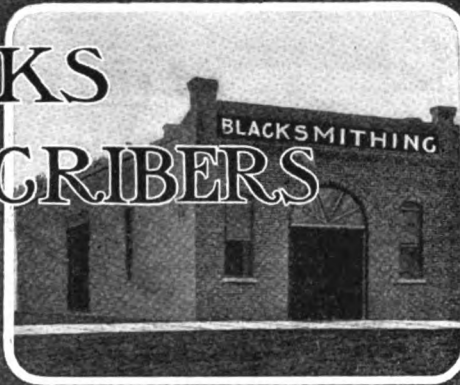
Don't inflate inner tubes until they have cooled, for a bulge is liable to be the result.

The tire pump makes an excellent bellows for cleaning the dirt from sand-pockets or casing cuts, as well as for drying the gasoline after washing the canvas.

The operation of vulcanization is simple enough in itself, but great care should be given to the proper curing of the rubber, as this is more than half the secret of the process.



TIMELY TALKS WITH OUR SUBSCRIBERS



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A New Series

This month finds a new series of articles starting in "Our Journal"—a series on automobile repainting by Mr. M. C. Hillick. Mr. Hillick is an old friend and contributor to our columns, and older readers will welcome him in the guise of an automobile painter, while newer readers will soon find themselves looking for his monthly installment. Mr. Hillick, as most AMERICAN BLACKSMITH readers know, is an expert on paint and painting, and has had a very considerable experience in all branches of vehicle painting and in imparting his ideas and experiences to others. If you are doing any automobile painting now, you'll be much interested in Mr. Hillick's articles. If you are not at present doing automobile painting, Mr. Hillick will tell you how to do this profitable work.

Are You Helping?

Every reader of a trade publication should be a contributor. The real reason for the existence of a trade paper is to help the trade and the men in that trade. The way help can best be given is by the free exchange of ideas and methods. This has been the foundation upon which THE AMERICAN BLACKSMITH has been built. We have always sought sound, practical articles by practical men rather than articles by professional writers; and some of the foremost authorities have contributed to these pages.

But we want every reader to feel that he also is a contributor. Surely, at least once a year something occurs in your experience that is worth passing on to your brother craftsmen! Write it up and send in a description of it. Just tell about the how, the why and the wherefore—describe each step in your own language, and we'll do the rest.

Subscription Agents

When a stranger solicits your subscription to THE AMERICAN BLACKSMITH, or any other publication, insist upon his showing you absolute proof that he is an agent in good standing and is employed by the publication which he represents. Don't, under any circumstances, give the man your money if you are not sure that he really works for the paper he says he does. No matter what the man offers you—no matter what price he makes—no matter what premium he promises to send—DON'T GIVE HIM YOUR MONEY IF YOU ARE NOT SURE.

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The Important Thing

Of course, you know "Our Journal." You know that THE AMERICAN BLACKSMITH is "published monthly"—that it has "quite a few readers"—and that you read it regularly. But, do you know that it is generally considered THE authority on matters pertaining to blacksmithing? Do you know that its articles on Business and Accounting are creating a very considerable stir in smithing circles and in association activities, and that these articles have already started several thousand shops on a new financial basis? Do you know that great changes are going on in the craft, and that these changes are being successfully negotiated by AMERICAN BLACKSMITH readers who have been able to read the "writing on the wall?" Do you know that not another publication on earth can show such a paid-in-advance list as THE AMERICAN BLACKSMITH can? Do you know that only a part of the good service done by "Our Journal" is made apparent through its pages? Do you know these things? They are the important matters in connection with a real live, trade paper. Think them over—and tell your neighbor.

Honest Advertising

Honest advertising laws have been enacted in nineteen States, and still the good work goes on. The States which have passed laws prohibiting fraudulent advertising, under penalty, are: Connecticut, Indiana, Iowa, Maryland, Massachusetts, Minnesota, Michigan, Nebraska, New Jersey, New York, North Dakota, Ohio, Oregon, Pennsylvania, Rhode Island, South Dakota, Utah, Washington and Wisconsin. This is an excellent beginning, and we hope that another year of legislation will find every State in the Union with a real honest-advertising law on its book of statutes.

THE AMERICAN BLACKSMITH has always stood for honesty in advertising and has backed up that stand with a guarantee that few publications have equaled and that none have surpassed. THE AMERICAN BLACKSMITH is a staunch advocate of honest dealings and fair and square methods, and the move announced above on the part of nineteen States is most gratifying to us. It simply shows that our Honest Dealings Paragraph, framed fourteen years ago, WAS right, and that it IS correct today. More power to honest advertising and to honest advertisers! May the tribe of honest advertisers multiply and may their business increase by ten, an hundred, yea, a thousand fold.



WHY?

WHY WILL SOME FARMERS ANSWER THE PLEAS OF STRANGERS AND "TURN DOWN" THEIR "BEST FRIEND"?



Repainting the Automobile—1

M. C. HILICK

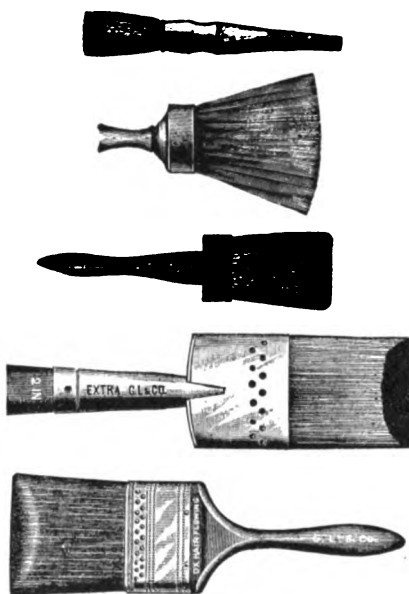
The Shop and Its Equipment

UTILIZE every available inch of floor space for working purposes. Locate the shop, if possible, on the first floor. Furnish it with enough windows to get plenty of light in all parts of the shop. Provide adequate heating arrangements, so that the place can be uniformly heated. Secure a system of ventilation that will furnish at all times a free distribution of fresh air; using the windows for ventilating mediums only as a last resort. Furnish the shop with a number of strong wooden horses. With a stout wagon jack, or two, the work can be gotten upon these horses. A kit of tools (which includes, among other things, wrenches of various sizes, bolt clippers, screw drivers, hammer, saw, punches, cold chisels, etc.) will be needed.

To clean the floor and shop, a vacuum cleaner is the latest and best tool. Install a No. 2 hand power paint mill which will weigh about 40 lbs., hold one gallon of material and cost about \$7.50. For grinding coarse pigments and working up scrap material it will more than pay for itself the first season. Place this mill near a window and within reach of it; arranging some shelf space for paint and varnish containers. In front of this shelving arrange the paint bench, on one corner of which provide a slab of smooth stone, marble or hard wood. Here the necessary mixing of all paint supplies should be done. Under the paint bench put in a number of drawers in which should be kept sponges, chamois skins, putty and palette knives, and packages of dry material.

The principal tools in this shop will be brushes; of which a good supply should be kept in stock. In a small shop, there should be at least three good oval dusters, and half a dozen camel's-hair brushes running in size from one inch to thirteen inches; one brush of this size being kept for coloring the largest body surfaces. Further, provide half a dozen oval, chiseled pointed paint brushes, a couple of oval, chiseled pointed varnish brushes, badger-hair flowing

brushes, and flat, chiseled flowing varnish brushes; three oval, chiseled sash tool brushes (to be used for washing-up purposes), two complete sets of bristle varnish brushes (for car body work); one set for applying finishing varnish, another for putting on rubbing varnish; each set to consist of not less than five brushes, and the set designed for finishing work to be full elastic best bristle brushes; size of brushes to run from one inch to three inches in width. Separate containers should be provided for these last two sets of brushes, and a third container will be needed for the chassis or gear varnish brushes and for miscellaneous varnish brushes.



THE PRINCIPAL TOOLS ARE THE BRUSHES

These containers should be equipped with a tight-fitting cover and furnished with lock and key, to insure them against being tampered with when not in use. Suspend the finishing varnish brushes in finishing varnish, rubbing varnish brushes in rubbing varnish, and so on. Put in stock three good square point putty knives, one beveled point and one oval point putty knife, also, a couple of good palette knives and one large two and one half inch half-elastic scraping knife, for putty-glazing purposes.

Three twelve-quart galvanized water pails should be provided, and

the water supply, if possible, should be piped directly into the shop.

To Touch Up and Varnish the Automobile

Whenever possible, wash the car before it is taken into the shop, where it should be located in the best available light. Get it up on the wooden horses; removing the wheels and such other parts as may be actually necessary, but no more. This is a class of work in which the minimum amount of unhangings should be practiced. Saturate the under parts with a mixture of one part crude oil and two parts turpentine. Let this stand for some time, to soften up the old oil and grease incrustation. Scrape those parts that do not give way to this mixture with mowing machine knives, pieces of glass or with the putty knife. This is hard, but most important, work. The car cleaned from all grease and oil may fairly be said to be more than half finished. Rub the body of the car with a piece of felt or, better still, with a perforated foot pad, first dipped in water and then in pulverized pumice stone. Rub sufficiently to deaden whatever varnish gloss there may be and also to remove any dirty specks from the surface. The more exposed parts of the chassis should also be lightly rubbed over with the same medium. The car top if leather or rubber should be sponged off with tepid water, carrying a very light solution of Castile soap. All upholstery and interior furnishings of the car are now to be brushed out and made clean and wholesome. Next, touch up all color defects with a color matched to that on the car. Touch only the necessary places, and confine this touch-up color exactly to the defect. Use the color thin and avoid making a rough edge.

Use a camel's-hair pencil brush or lettering pencil for touching up; adding enough varnish to the touch-up color, when the correct shade is reached, to cause the color to dry with a slight gloss. When dry, this color will then be of the same shade as that of the wet color previous to application. Proceed in the same way with the chassis or gear. If there are any deep cuts or fractures in the surface



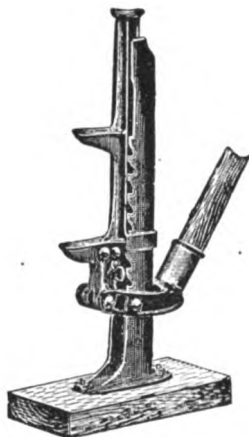
of the car which require filling up and mending first, scrape all such defects out, clean, and touch up with a color containing enough oil to fasten it hard to the spot. Then when dry, fill the cavity up with hard drying carriage putty; plastering it smooth, as a means of reducing the work of rubbing. When dry, rub the putty with a block of artificial pumice stone dipped in equal parts of raw linseed oil and turpentine. Clean off at once and apply two coats of the touch-up color to all such defects.

Next, dress the top, if such treatment is required, with some good reliable renovator. If a mohair top, simply brush off with a whisk broom.

Now proceed to wash first the car body and then the running parts with clean water; using a sash brush or wash tool, as it is variously known, in getting around mouldings and other attached fixtures. Clean varnishing depends primarily upon the thorough washing of the surface. Follow the washing with a careful dusting, after which proceed to varnish the body of the car, then the mud guards, chassis, etc. Coat the radiator with a thin mixture of aluminum bronze or paint, and fit out all minor parts with a touch of paint or varnish, so that when released from the shop, the job harmonizes.

About every little thing overlooked by the painter is sure to be discovered by the owner.

(To be continued)



A GOOD WAGON JACK HELPS

Meeting Competition Half Way

When Dave Phillips saw the doors of Thompson's new shop open up, he realized that he would not only have to fight hard for new trade but that he was in danger of losing his regular customers.

"I'll need to fight not only to get new business but to hold what I've got now," said Dave in commenting on the new shop to his son-in-law who had just come to pay him a visit. "But I'll show them something that will make them think they've gotten into the wrong town. If they cut I'll cut under them. My place is paid for and I can afford to go down lower and to stay under longer than they can; and when they're down and out I'll again have things my own way."

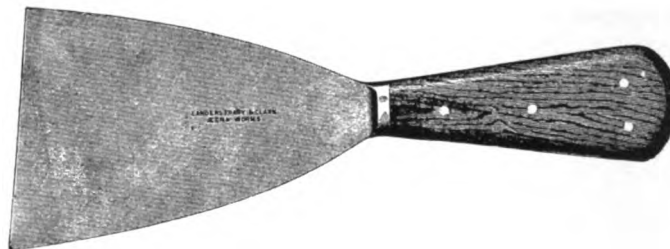
"I wouldn't do that," returned Jim Fowler, his son-in-law, "you will be cutting your own throat; and cutting the price is just what these new chaps want you to do. Now look here, Dad, you've been doing business in this town for a good many years. You've had things practically your own way, and have built up a good reputation for quality and honesty in your work. Now, if you come down in your prices, people will lose confidence in you, so you've got to wait and see how Thompson starts out. Just wait and see what he does—then we'll see what means of defense will best suit our side."

But they didn't wait long. Thompson opened with a "blare of trumpets," as it were. He announced his shop as the "Bridge Street Bargain

Shop." He put up a sign reading that way and used a fair amount of space in the local paper. In his first announcement he came out boldly, saying that he would do shoeing for one-fifty, and that other prices would be proportionately low.

As Phillips was getting two dollars for shoeing, this was a direct slap at him, and he was for making a cut down to one-twenty-five. But Son-in-Law Jim held him in check.

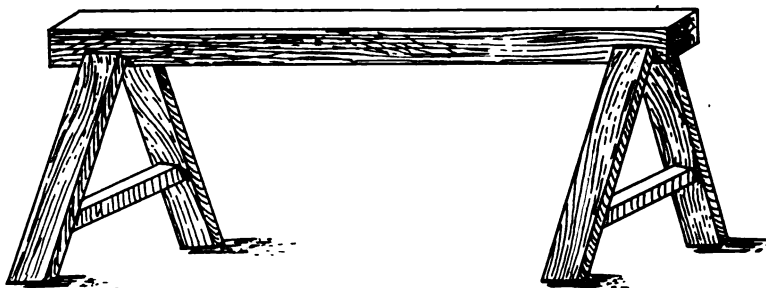
"Look here, Dad," said Jim, "it isn't at all necessary to cut prices in order to fight a price-cutter. Just look at this thing right and we'll soon have this chap tamed. Your shop is looking fairly good, but suppose we give it a coat or two of paint. A light grey will look well—it's a hard-wearing paint and will make the



PUTTY KNIVES AND A GOOD SCRAPER ARE NECESSITIES

shop stand well out from the dark-red structures on each side. Then we'll get a new sign. This we will have read as follows: "Dave Phillips—Bridge Street Quality Shop. And then we'll get out a series of letters, post cards and circulars, talking quality, fine workmanship and fair prices. These we will send at regular intervals to every horse-owner, farmer and vehicle-user in the town and surrounding territory. I wouldn't be surprised if the boys would be glad to deliver them on Saturday afternoons, with their bicycles; and this scheme has got all newspaper advertising stunts beaten, because Thompson won't know what you are doing and saying until we get the matter out and someone shows him a circular."

And so, with little delay, Phillips with the aid of his son-in-law carried out the foregoing program. At first, Thompson was puzzled—he couldn't understand why folks didn't flock into his shop and overwhelm him



A NUMBER OF GOOD STOUT WOODEN HORSES ARE NEEDED



with work. But it wasn't long before he found out. "How is it, I can't get your shoeing business, Mr. Cleaver?" he asked the butcher one day. "I'll save you money not only on your shoeing but on your wagonwork as well. Now, why don't you give me a chance?"

"Well, I'll tell you, Thompson, I've been dealing with Phillips ever since I came here, and he has always treated me right. When you came here, you busted into town like a man who was going to tear up the entire village by the roots. And when you opened your shop, and about the time I was wondering if it wouldn't be a good idea to try you out, I got a very nice letter from Phillips that made me feel like going out in the barn and letting the horse kick me. A man who puts the proposition up to me as Phillips did deserves my trade and the trade of every merchant in this town. The best I can give you, Thompson, is a little advice and that is to quit the town or work for Phillips."

And when Thompson went out, the butcher again read Dave Phillips' letter for the eighth time:

Dear Friend:—

Of course you're wondering how I've got the nerve to charge two dollars for shoeing when another shoer can do shoeing at one-fifty.

Now just figure it out—all I want is a just and fair profit. You don't want me to do your work at cost. If I did, I would soon be forced out of business; the merchants in town would have me on their books for various amounts, and that always affects the entire business life of the town.

Now then—just figure it out in actual costs. My cost of doing business is very close to 68%. That includes all charges known as overhead—interest on investment, salaries, rent, depreciation, losses, insurance and all miscellaneous items—and that 68% has to be carried by every piece of work I do.

In the case of shoeing, which we are considering in this instance, the actual cost of the materials used in putting on four new shoes is 27%; that added to the overhead makes 95%; leaving me a small profit of 5%. Is that too much? Just consider the matter on this basis, and then ask yourself if I am unreasonable—if I do your work right—if any smith on earth can give you the service, the work and the satisfaction for less than two dollars.

Yours for sane business,
DAVE PHILLIPS.

Welding Copper and How It Is Done

CONSTANTINE DUNCAN

The accompanying engraving shows a few specimens of welded

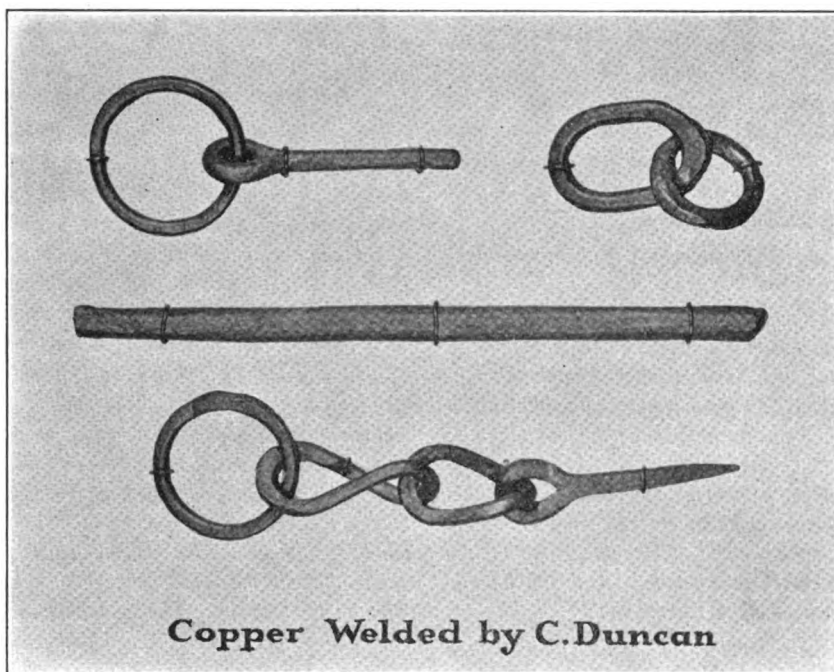
copper which I recently tried as an experiment. I welded this with a hand hammer at an ordinary blacksmith's forge. I mixed my own chemicals, and the first piece I tried welded all right. Although work of this kind has no great commercial value, still, I consider it worth something to be able to do it.

As a flux I used two parts sodium of phosphate and one part of oxalic acid, with enough pulverized borax to hold it together in a thick paste. Bend and scarf the copper the same as iron and use the flux same as borax. The heat should be raised very slowly and cautiously, as the

many in his territory are the kind of people who will pay for service. He doesn't make an analysis based on research into the kind of business he ought to handle, and then go after that kind, but he imitates and, of course, he loses.

Doesn't it seem that it might be reasonable to make a scientific, business-like analysis of the human elements he has to handle in business?

These ideas are not even new. Quite recently, the Bureau of Business Research of the Graduate School of Business Administration of Harvard University sent out a bulletin describing certain researches it made



SOME OF THE COPPER WELDED BY MR. DUNCAN

margin between the welding heat and the melting heat is very small.

"Standardizing the Retail Business"

E. ST. ELMO LEWIS
Burroughs Adding Machine Co.

The trouble with the small business is lack of organization and imagination, and lack of realization that the fundamental difference and distinction between the big and the little business is the little man who is little because he is little; he is rule-of-thumb; he imitates rather than adapts—he sees the big business making great bargains, and he rushes to price. He doesn't train his people for service. He doesn't know how

last year into the conditions in the shoe business in Ohio and Wisconsin, through which it made a scientific study of the failures and successes in the shoe business. In Bulletin No. 1 they say:

"The Bureau represents an approach to the scientific study of business, which up to the present time has developed in the main in an empirical, rule-of-thumb fashion. There is a general feeling that the time is now at hand for the business man to have more scientific information to aid him in meeting and solving his problems."

In another portion of the report it says:

"In manufacturing, much has already been done in the direction of



scientific study and standardization. But it (the criticism relative to rule-of-thumb methods) is especially applicable to the great division of business—market distribution. It has been less explored, less standardized than production. There is need for real facts about the different methods of distributing goods from the producer to the consumer, and the cost of these methods. These facts, to date, have not been brought together in any one place.”

Then follows an extremely interesting survey of what the investigators found in Ohio and Wisconsin.

I suggest that whether you are in the shoe business or not, write to Mr. S. O. Martin, Director of the Bureau of Business Research, Harvard University, Cambridge, Mass., and get a copy of that report. There is not a blacksmith or a horseshoer, or anyone for the matter of that, who couldn't get usable ideas worth the time and trouble.

Mr. Martin, the director, recently wrote me:

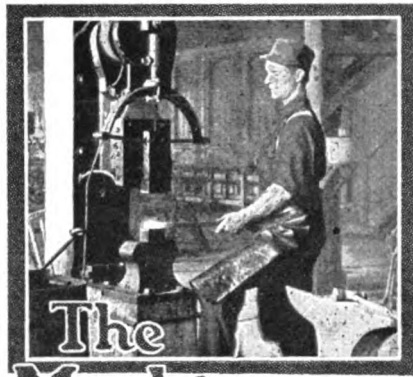
“It may interest you to know that since the publication of our first bulletin, on Accounting Systems, this edition has been practically exhausted. The principle of it has worked out satisfactorily with over six hundred shoe stores, so that no change will be made in it. It may interest you to know that we are now entering upon the investigation of clothing, groceries and hardware.”

You remember what Secretary Redfield said about the investigations of the Department of Commerce —“that they were going to make investigations among American businesses in an attempt to standardize many different business practices and functions.” He has told us that the Department of Commerce and Labor, through its Bureau of Standards, was about to standardize colors. If I asked each of you readers to pick out red, there would be as many different shades of red as there are readers. Yet wouldn't it be a good thing if we had a standard red?

So standards are coming into distribution; and standards are coming, therefore, into the small shop, for we need them. They affect the large department store as well as the smallest shop on the side streets.

Going to guarantee successes? I do not believe anyone will accuse me

of believing such a thing, but it will tend to distribute success.



The Machine and Tool Smith

Keys and Keyways

There is often occasion, in the general shop as well as in the shop that does auto-repairing, for cutting keyways. Keyway-cutting with a chisel is an art that requires considerable skill, though there are many men who can cut a keyway very nearly as well as it can be done by a machine.

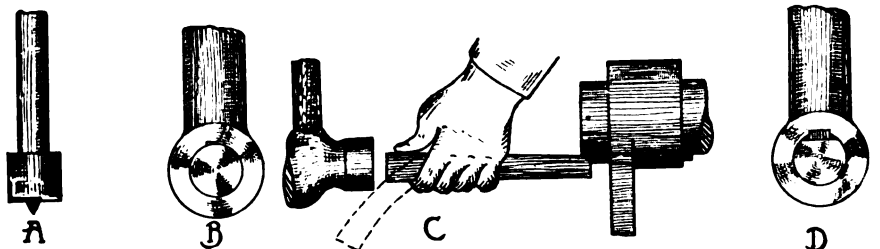
The first thing to do is to mark out the keyway with a line to show the center. It is best to have a few flat-bottomed drills (A in the engraving), and drill a series of holes in the shaft to the depth of the bottom of the proposed keyway. The holes should not be in actual contact or so they run into one another. Then, with a narrow chisel chip away the intervening

keyway and tight at the sides. Rough keys of different sizes can be bought at jobbers. It will save time in fitting if a dozen or two are procured.

In cutting the keyway in the wheel or boss to fit on the shaft, the keyway must be marked out (as at B in the engraving) on the boss at each side exactly opposite. This must be done carefully with the square, and the line drawn or rather scribed through the bore of the wheel. If, however, the key way in the shaft is larger than the boss, the boss may be marked from the keyway. The metal must then be chipped and filed away. Testing with a straight edge, the keyway will be found to be shallowest in the middle. This part must be worked down, using the edge of a flat file, or making the end of a square file into a scraper by grinding it at an angle of about 35° or 40°. (Old files should be put aside for this purpose.)

The tang or end of a file that goes in the handle may often be used for making keys. It must be remembered that the key and keyway must be slightly tapered. The key must be inserted and tapped gently in and then driven out, and it will be noticed that it bears hard in one or two places. These must be filed down, preferably by draw-filing, and the key again tried. This operation must be repeated until a good fit is obtained and the key is driven home with a heavy hammer

If the shaft projects from the boss,



THERE IS OFTEN NEED FOR CUTTING A KEYWAY IN THE GENERAL SHOP

spaces and file with a small, square file. As a square file is not an actual right angle at its corner, the angles of the keyway would be rounded off. Work these corners square with a saw file, but as a saw file has no teeth cut at its top end, the top must be broken off to allow the file to work up to the ends of the keyway.

The keyway must be of steel, fitted to bend down on the bottom of the

a drift should be used to prevent damaging the keyway by the blows of the hammer. The drift (see C in the engraving) is a steel tool with a hardened nose. It is sometimes curved (note dotted lines), as in many cases it is impossible to get a straight blow at the key. Care should be taken not to burr up the end of the key. A piece of stout copper held over the end of the key by an assistant will prevent this.



Another form of keyway (shown at D) has a flat surface on the shaft. This method should only be used when the strain is in one direction only, and not for severe strains. The key on a flat shaft is more likely to get loose than when it is placed in a sunken keyway. A flat key is usually wider than a sunken one.

When a keyway is not at the end of a shaft, and the key being sunk cannot be driven in, the key is first placed in position and the wheel or boss driven onto its right place.

If a key gets loose, the best thing is, of course, to fit a new one, but old keys may be made to hold by packing up in the keyway. A piece of thin watchspring of the width of the key is the next best thing to use. If it is too thick, it can be ground down on the grindstone by fastening a longer piece than is necessary to a piece of wood and then grinding.

A Shop-Made Grinder

N. G. NEAR

The engraving shows a grinder that I made for rough grinding. I forged and turned everything except the stones and the pulley, and it is still giving good service.

The foundation and frame are one piece, as indicated, of concrete. The foundation is set down in the ground about two feet, and the center line of the shaft is four feet above the ground. The bearings (B) are made of strap iron, and babbitted. They are held firmly in the concrete by the anchor bolts and plates (A). In the center of the concrete frame is a depression, to allow for the pulley and belt. I used the collars (C) on this machine, but I would advise omitting them and turning a shoulder on the shaft instead, as I experienced a little trouble at first, in being unable to make the collars rigid. The inside collars holding the stones are, of course, held by the collars (C), while the outside collars are held by the nuts on the spindle.

This grinder is inexpensive and easily made. The only difficulty in making it is to get the bearings in alignment.

How an English Mechanic Tempers a Hammer

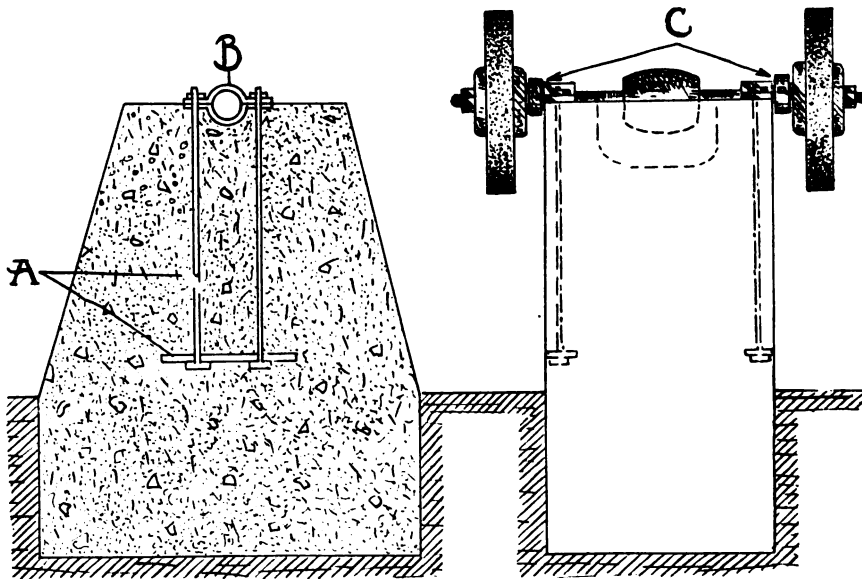
English Mechanic

To temper a smith's or fitter's hammer properly is one of the jobs

which many an otherwise good forge-hand either never acquires or foolishly forgets.

First assure yourself the steel is good; next, in the making, take care not to overheat or to hammer when

face shows signs of lessening. When this part has been sufficiently long submerged (and only practice and size of job can determine this), twist the supporting rod so as to bring the face end into the water; always taking



A SIMPLE YET SUBSTANTIAL STAND FOR THE GRINDING WHEELS

black-red. Assuming this to have been attended to, the next point is to slowly heat the hammer-head to a fairly rich red, and dump into red-hot ashes placed in a pit scraped in the hearth as near as convenient to the fire, and cover up tightly and soundly with fine hearth-ash dust, and allow to remain till cold—say, all night. Dress up.

Now make a hollow fire, by the simple expedient of allowing a chunk of wood to burn out in the center of a heaped fire, so as to form an arched cave with an opening towards the front of the hearth. Into this insert your now annealed and finished hammer-head, holding it on a stiff rod flattened at end to loosely fit the edge, and with blast at half-cock let the heat soak well in. While this is proceeding, fill the water trough to within three inches of the brim, flinging into it a handful or two of cheap salt, if it is procurable. When the work is at a rich red heat remove, and by letting the rod rest on the edge of the trough allow the peen end to dip into the water; taking care not to allow the eye part to be touched by the bubbles thrown up.

As the peen end contains much less material than the face, it will be cooled almost sufficiently for tempering purposes before the heat of

care to keep the eye above surface. During this part of the cooling, keep a strict watch on the temper color of the peen part, which now begins to creep up, and should it show signs of arriving too quickly it is arrested by a quick twist of the rod on the trough edge, bringing the face momentarily out of the water and the peen in. Usually, however, when the face has had sufficient first dip, the peen is ready for cooling out, while the truly business end of the hammer is closely observed for the correct temper color, and as soon as this arrives twist rod again so as to immerse that end. When the face temper is right, all that is necessary is to continue to rotate the supporting rod slowly, dipping "heads and tails" alternately till the eye has arrived at a safe heat for cooling—i. e., when it is black-hot. This method of tempering hammer heads with good steel correctly handled cannot fail, as care is taken to keep the eye walls soft; and the hot-red end, which fits in the eye during the operation, allows of sufficient heat being retained in the job itself to run the temper color to the ends. Though long in the telling, the job is simple in execution, and may be logged as under:

Tempering Hammer-Heads—Take good tool steel, do not overheat nor



work when black-hot, anneal and finish, heat slowly on rod placed in eye, lay rod on water-trough edge and, by revolving same, cool ends alternately, commencing at peen, never allowing eye parts into water till black-hot, when cooling out can take place.

The Hardening of a Bandsaw Braze

After the two ends of a bandsaw have been brazed together, the saw will be found to be soft at this place, notwithstanding that the greatest care has been taken with the operation, says *Wood Craft*. If the saw be left in this condition, it is very liable to bend and kink at braze, entailing considerable trouble to put right again. This trouble occurs even though the saw be very carefully handled when taking it off and putting it on machine, and when sharpening, rolling and setting it.

According to the most approved directions for brazing, the bandsaw should be taken out of the clamp as soon as the brazing irons lose their color and become black, and the saw should then be allowed to cool rapidly in the air. It is true that if this is done at exactly the right moment the saw at the braze will be much harder than if left in the clamp until nearly cold.

At the same time it is difficult; and very careful watching is necessary to judge precisely the right moment; and as there is no means of telling exactly how hot the irons are except by their color, there is an element of uncertainty about the process. On a bright, sunny day, when the light is very good, the irons will appear to be black much sooner than on a dark day when light is bad; and making allowance for this adds to risk of error.

Some men will further harden the saw by accelerating the cooling process with a cold blast of air produced by a pair of hand bellows; but there is a risk about this method, as the cooling may be local or uneven, causing the saw to be brittle in places, and the blast may be applied when the saw is too hot or too cold. The easiest and most certain method, it is further claimed, is to harden by a separate operation given in the *Timber Trades Journal*, as follows:

After saw has cooled and the joint has been carefully filed and dressed down to the same thickness as the

rest of the saw, place the saw on rollers over the leveling plate and anvil, with the joint lying flat between the two, and just clear of leveling plate. This should leave a few inches clear under the joint. Now take an iron (an old wornout brazing iron will answer very well) and heat it to a bright cherry red quite as hot as, or even a little hotter than, when brazing.

As soon as iron is hot enough, hold it under the joint—two or three inches below to start with, and gradually raising it until close to the saw, keeping it moving backward and forward all the time, so that the saw is warmed up evenly the full width.

As soon as the saw shows a dark straw color it is hot enough, and should be slipped along onto the cold leveling plate and a block of cold iron placed on top.

This requires to be done very smartly, so that the saw loses as little

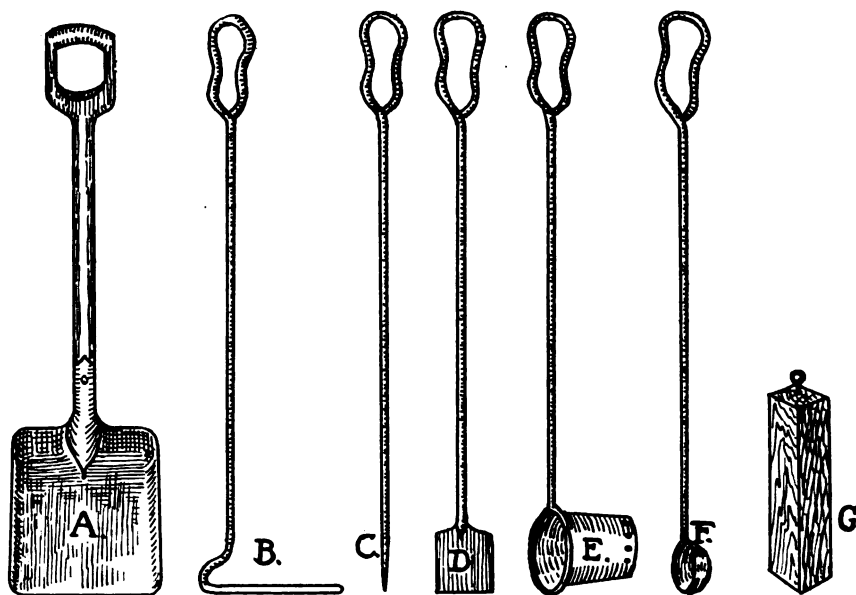
by hand, while the heat is being applied to the saw by the iron.

If preferred, and gas is available, the heat can be applied by a gas jet; a length of tube with holes at intervals for the jets being used, attached to a piece of rubber pipe with a tap for regulating the heat. In fact, some prefer this latter method as being less trouble and quite as effective.

Building and Maintaining Forge Fires

J. C. LAMON

I will not endeavor to describe any particular forge or forge construction in this article, but will try and give the best manner of building and maintaining the fire. (I will say, however, that one thing of very much importance, but often overlooked, is the quality of coal, which should be the



EVERY FORGE FIRE SHOULD HAVE A COMPLETE SET OF FIRE TOOLS

as possible of the heat until it is suddenly cooled by the cold iron, when the job is done.

It will be noted that with this method the exact moment of taking the saw from the clamp is not of great importance, which, as the irons take some few minutes to cool after brazing, is a convenience, as then you need not stand watching all the time.

Should the leveling plate and anvil be too close together to allow of the iron being placed between them, the saw can be held up from the plate by two pieces of wood, or even held up

very best that can be obtained.) Slack coal is the best to use, because of having no lumps larger than will pass through a $\frac{1}{2}$ -inch-mesh screen. Have the stock stored near the smith shop, so as to avoid delay in bringing it to forges for use. Have a mixing box provided at each forge where coal is dampened down, so that it will pack when fire is built. Each fire should have a set of fire tools as follows: A, a No. 2 shovel—B, a hook—C, a poker—D, a small fire shovel—E, a spoon—F, a sprinkler—and G, a block of wood, 5 by 5 by 20 inches.



The engraving, Fig. 1, shows the proper shape of fire tools.

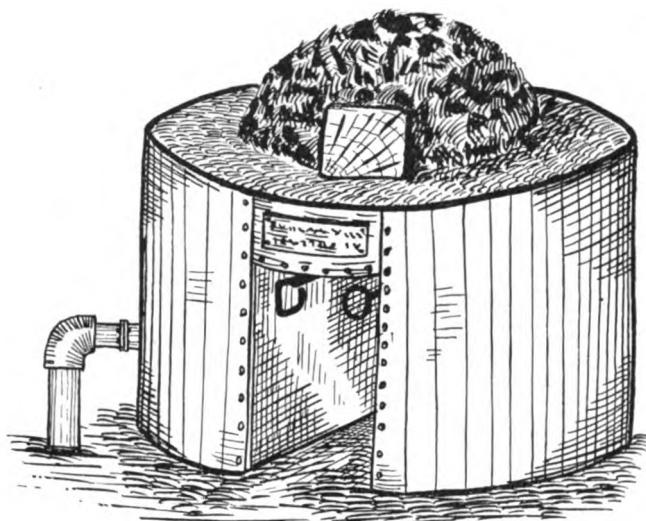
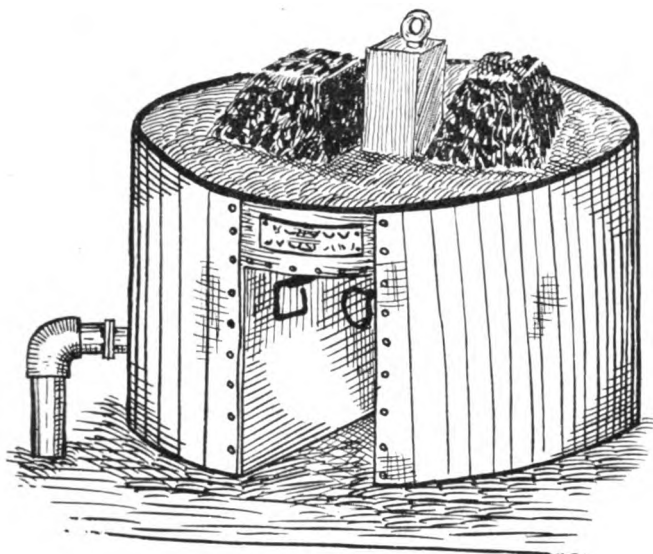
To build fire, place block G on tuyere opening, wet coal thoroughly and then pack it around block with light sledge. This confines fire to a small place and allows coal to coke, which provides stock coke to use at

al of any kind which will ignite readily when fire is well started. You are now ready for business. To build a hollow fire, proceed as above and, after fire has gotten well started, place some heavy pieces of coke on banks (allowing blast to be on gently all the while). Pack wet coal on until

2. The length of time the debt is to run should have a close relation to the productive life of the improvement for which the money is borrowed.

3. Provision should be made in long-time loans for the gradual reduction of the principal.

The first rule is, of course, the key



THERE ARE, IN GENERAL, THREE KINDS OF FORGE FIRES, I. E., THE FLAT FIRE, THE OPEN FIRE AND THE HOLLOW FIRE

fire. Fig. 2 shows the block in position, with section of coal packed around it.

The next step is to make banks which keep the fire confined and also hold the coke. Of course, the class of work being done determines style of fire to be constructed. Regardless of the class of work, however, we would proceed in the manner already described until banks are to be used or discarded as the case may be. For instance, in turning a flange on a large sheet, only one bank on left side would be necessary, or in making a large plate that is to be cupped or bent in center, no banks at all are required. Where a large built up forging is to be made, to secure a nice mellow heat a hollow fire should be made. There are, in general, three kinds of fires: the flat fire, for flanging, bending large plates, etc.; the open fire for general forging and welding; the hollow fire for heavy welds, built up forgings, large blocks for forging, etc.

To build the banks, pack the coal on each side of the block until proper height is secured, then square up, remove block and everything is ready to start fire. Fill up the hole with live coal, or use waste or dry materi-

a nice mound is constructed and, when the fire gets well burned out inside, you are ready to proceed with any class of work from heavy welds and forgings to heat refining and drawings.

Five Rules for Borrowing Money

Of quite as much interest and value to blacksmiths as to farmers are the five rules designed to convince farmers that there is no magic about credit set down in Farmers' Bulletin 593, "How to Use Farm Credit," which the United States Department of Agriculture has published. Unless the smith who is thinking of borrowing money fully understands these rules, and is willing to be guided by them, the Government's advice to him is: *don't!* As it is, there are probably almost as many farmers and smiths in this country who are suffering from too much as from too little credit.

Of these rules the three most important are:

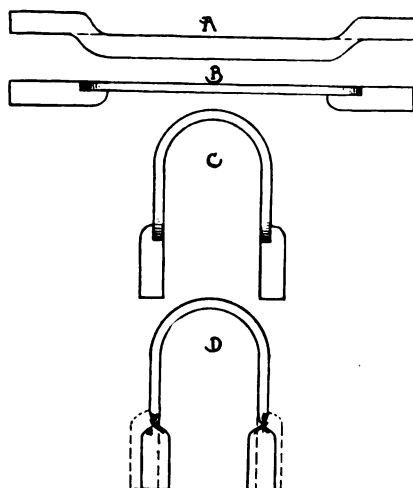
1. Make sure that the purpose for which the borrowed money is to be used will produce a return greater than needed to pay the debt.

to the wise use of credit. Between borrowing money to spend on one's self and borrowing money to buy equipment of some sort with which to make more money there is all the difference between folly and foresight, extravagance and thrift. If the money is borrowed for a wise purpose, it will produce enough to pay back principal and interest and leave a fair margin of profit for the borrower into the bargain. If it is borrowed for a foolish purpose, it will produce nothing, and consequently there will be nothing with which to repay the loan. From this point of view it matters comparatively little whether the interest be high or low. It is the repayment of the principal that is the chief difficulty.

Rules 2 and 3 deal with the most satisfactory ways of repayment. Underneath them both is the same principle: The loan must be repaid with the money it earns itself. For example, if the money is used to buy a machine that will last ten years, the machine must earn enough in that time to pay for itself, or it never will. The loan, therefore, should be entirely repaid before the ten years are up, or the farmer will lose money on the transaction—paying out interest for no



benefit in return. On the other hand, if too early a date is set for repayment, the machine will not have had sufficient opportunity to make the requisite money, and the borrower may have difficulty in raising it elsewhere. Rule 3 provides for an easy form of payment; a system by which the



STRAP HANGERS ARE USUALLY MADE WRONG

principal is repaid in installments so that the amount of the loan is continually diminishing, and in consequence the interest charges also. Such a system is quite feasible when the loan is really productive; when it returns to the borrower a definite revenue each year. Tables showing the payments required to pay off principal and interest in varying periods of time are appended to the bulletin and are recommended to the serious consideration of everyone who contemplates borrowing money. The bulletin also advises the farmer to secure the lowest possible interest. At first sight this seems too obvious to be worth mentioning. Of course the interest should be as small as possible. Everybody knows that—except the lender. But if the other rules are observed, if the borrower manages his financial affairs soundly, he will be surprised to find how much easier it is to obtain favorable terms. The right kind of lender does not want to foreclose mortgages; he wants his money back with a fair profit; like any other merchant. For money that is borrowed wisely, for money that is sure to be repaid, he charges low interest.

This, in fact, is why the Government has published these rules for borrowers. It is not so much a matter of driving a shrewd bargain as it is of

observing a few fundamental principles which alone can make credit a blessing and not a curse.

A Neat Strap Hanger

BERT HILLYER

Strap hangers for holding up pipe or timbers are generally made the wrong way, as shown in the engraving at D. This reason has led the writer to give a brief description of a very neat, strong hanger, as shown at C. This hanger is made with less trouble than the twisted one which has to be abused in hammering the twist to one side before it will line up correctly. It is a difficult job to get the twisted strap to remain flat on the back and also have straight lines inside to fit over the timber, so that it looks nice and neat.

To make hanger C, offset the ends the width of the iron as at A, then bend square at dotted lines and it will look like B with two straight sides. It is then bent with the straight line inside to the shape of the timber or pipe. To the smith who has not made one this way, I would suggest taking a piece of paper, cut out as at A, bend on dotted lines, and at a glance he will quickly see that it is the correct method.

Forge-Fire Making

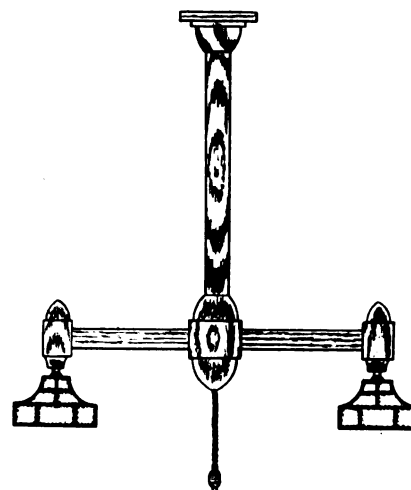
H. N. POPE

Some time ago I read an article on the fire question. I venture a few words on the subject.

The first and most essential object is coal, which should be of the best quality, but as it is not always the privilege of some of us to do the buying, we are obliged to do the best we can with the kind that is supplied to us. First of all, the forge should be thoroughly cleaned of all ashes and cinders, and don't forget to clean the underside as well, as one cannot get a clear blast if ashes are left in the bottom of the box and the blast forced up through them. Cinders are then bound to be driven up into the fire-box. A good way to start the fire is to take a stick about four inches thick, that tapers down to about two inches, and place the small end over the hole in bottom of firepot and pack all around with wet coal, after which stick can be removed. Be sure to get fire started clear to the bottom and have plenty of good coke to feed with.

Keep sides well packed and run fire level, and no difficulty will be experienced in getting a good heat. Many smiths do not give enough attention to their fires. I have known men who would poke the ashes away with their hand to make a little opening, put in their kindling, get a blaze started and then expect to do good work. This is a great mistake, as good work with a poor fire is impossible. Another man will continually run the poker into the fire and lift it up. To my mind, this is bad practice—keep fire close and well packed is my way of doing.

There is only one thing to do when a fire becomes poor, and that is to clean it out and build a new one. I saw an illustration of this a few days ago, where the smith had been working his fire all morning, heating only when a job came along that required a weld. At the end of the day he did not want to bother with the fire, so he put some coal on and started a job. It looked well in the fire, but, as soon as the air struck it, it turned a pale yellow and would not stick. The man tried a number of times without results, until finally he threw it down in disgust and said he believed he had forgotten how to weld. Later on, the helper made a new fire, and the smith started again; this time having two welds to make, as the piece had wasted away with the many heats. With the new, clean fire he had no trouble whatever. Hence, the fact is proven



A SUGGESTION FOR THE WOOD WORKER

that regardless of your ability you cannot do good work with a poor fire. While every smith knows that this is a time-worn and oft-repeated maxim, it is still necessary for those who believe that "a fire's a fire, no matter



what you do to it." It takes time, of course, to build fresh fires, and causes inconvenience, but what is that compared to fuming and sweating over poor welds and having your customers continually kicking on your jobs?

The work of the smith, we may righteously say, is judged by the fire he keeps.

Home-Made Electric Chandelier

A. C. GOUGH, M. E.

The massive brass fixtures, finished in various effects, harmonize splendidly with the other furnishings of the popular arts-crafts room; the more delicate and intricate designs of fixtures lending themselves better to the room furnished with Colonial, Louis XIV and Rococo designs of furniture. Perhaps, the modern, plain, massive brass fixture is the most acceptable of all for the arts-crafts room, but designs in wood offer splendid possibilities in appearance as well as in the low cost of making for those who wish to make fixtures for their own use or for an occasional customer.

Where the boards, casings, mouldings, etc., of a room are finished in oak or dark wood, the wood chandelier may be finished to match; or when a room is finished in white, the

effect of age which is really artistic and lasting.

That the possibilities of designs in wood have not been sought is probably due to the fact that underwriters do not favor conduits constructed of wood. However, with a building constructed of wood, it might seem rather difficult to wire it without passing the wires through the wooden walls, etc. In this case, the underwriters require that the already heavily insulated wires have an independent casing of circular loom or porcelain, supported within the hole through which the wire passes. While it is not nearly so important that the chandelier be wired with such precaution for safety, but that the wiring may not be questioned by the Insurance Companies, circular loom of good size and strength may be used to cover the wires throughout. If good-size, rubber-covered or weatherproof wire is used, it is not at all necessary; but it may be most desirable to use independent pieces of circular loom upon each of the branch wires which extend to the sockets, with two larger pieces of circular loom within the vertical part, each containing the wire or wires forming one side of the circuit. However, with rubber-covered or weatherproofed wire, it is more than safe to use one piece of circular loom for the branches, with a large piece of circular loom covering the wires through the vertical part.

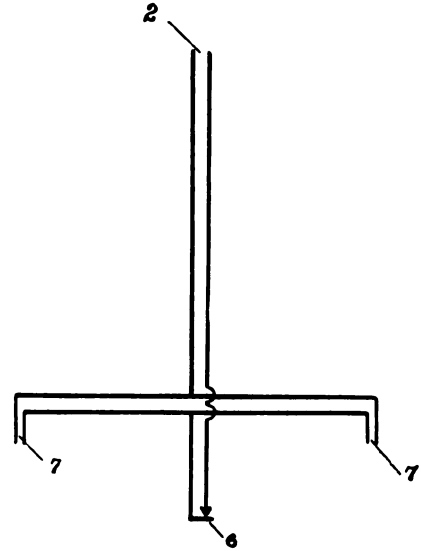
The following table gives the values of currents allowed by underwriters in wires of various sizes:

	Rubber-Covered Wires	Weatherproof Wires
B. & S. G. Amperes		Amperes
No. 18	3	5
" 16	6	8
" 14	12	16
" 12	17	23
" 10	24	32

A large incandescent lamp does not usually require more than one ampere; so No. 18 or No. 16 wire would have a current-carrying capacity much larger than necessary; except, when electric heaters are to be used upon the circuit, much larger wires should be used—say No. 12 or No. 10.

If the mechanic understands joining the wire electrically as well as mechanically, No. 18 wire may be used in the branches; one side of each branch being joined to No. 14

wire which extends up through the vertical part. If the mechanic is not familiar with this method it would perhaps be better to let the small wires extend up the entire length, making one side of the circuit, so that the number of wires may be



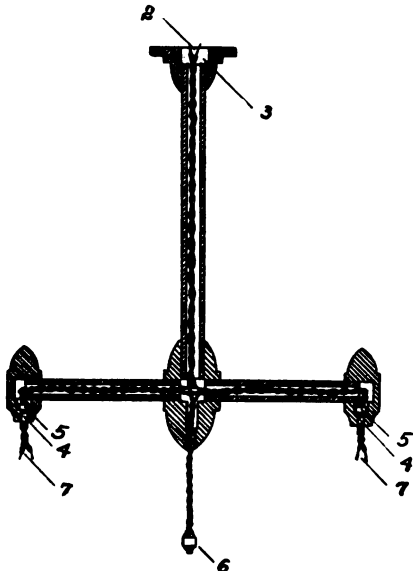
A DIAGRAM OF THE FIXTURE WIRING

properly divided and secured at the terminal of the rosette.

A space at the top of the fixture, as indicated at 3, Fig. 2, may be provided of such a size that it will not be necessary to remove the base of the rosette; the wires being secured by the screws under which the feed wires are secured.

The central vertical part of the fixture may be constructed of two pieces glued together. These pieces should be grooved or slotted so that when they are secured together there will be a hollow space throughout not less than 1 inch square. The outside dimensions of this part should be 2 inches square or more. The branch arms may be 1 1/4-inch square or more, with blind slots or grooves to receive the wire as indicated in Fig. 2.

The 1/8-inch pipe nipple, 4, upon which the sockets are to be screwed, should have a drive fit; and a little glue may be used to set the nipple more firmly. As indicated in Fig. 2, the 1/8-inch pipe nipple should have a nut or shoulder to secure it in place. A diagram for wiring a chandelier of two arms is shown by Fig. 3; the sockets being connected at 7, 7, and the push button switch at 6. A large number of branches may be connected at the same points as the branches, 7, 7.



HOW THE FIXTURE IS WIRED

fixtures may be coated with a white enamel. Another effect which lends itself to the largest variety of color schemes is to first gild the fixture, then (after it is dry) wipe it with burnt umber. This may be easily done in a way that will produce an



The designs for a chandelier of this kind are unlimited in number; but the design shown, Figs. 1 and 2, possesses the advantage that it is as easily wired and assembled as the standard brass fixture.

It is believed that the mechanic may find it desirable to make chandeliers of this kind for his own home and, by looking up the matter of wiring electric fixtures, that he may add a profitable side line and sell them to his customers.

An Attachment for a Road Drag

DAYTON O. SHAW

To meet the requirements of new improvements, new inventions must necessarily follow. On all sides, the public is calling for good roads. There seems to be three classes of workmen greatly concerned in this kind of work; the engineer, the mechanic and the road agent. The engineer builds new roads, the agent keeps them in repair, and the blacksmith repairs the machines.

For repairing roads, the road drag has become a great factor. It is so common that I do not consider it necessary to give the dimensions. I will explain an attachment that I have invented for this machine. The idea suggested itself to me from my observation of a teamster endeavoring to cut some turf on the edge of the road. He piled on some stones,

jumped up and down on the drag a few times and then another man got on the drag; but with all the extra weight it was unsatisfactory. With the attachment which I am about to describe, one man and a team of horses, without any extra weight, can cut sod or clear ditches by simply throwing the lever over.

To make the attachment, take a bar of spring steel, 4 feet long, 4 inches wide and $\frac{3}{8}$ inch thick (A in the engraving). Drill a $\frac{1}{2}$ -inch hole in one end. Roll the cutting edge out a little so that it will dig. The hole in the other end should come back of the draw chain and a little above the center. Next, take a piece of iron, $4\frac{1}{2}$ inches long, $1\frac{1}{2}$ inch wide and $\frac{3}{8}$ inch thick. Space off 3 inches, drill $\frac{1}{2}$ -inch holes and rivet one end to cutter as at B. Then make a shipper (C) of the same size iron; making a round turn 8 inches from the end. Drill the two holes 3 inches from center to center and rivet at the end hole to the other piece that is fastened to the cutter. Do not draw the rivet so tight that the pieces will not work back and forth easily. This attachment is bolted to the front end of the drag $\frac{1}{2}$ inch above the cutting edge, so that it will not interfere with the regular cutting of the drag. The dimensions that I have given will drop the cutter 3 inches below the drag cutter which is sufficient to load a two-horse team. The length and weight of the shipper back of the

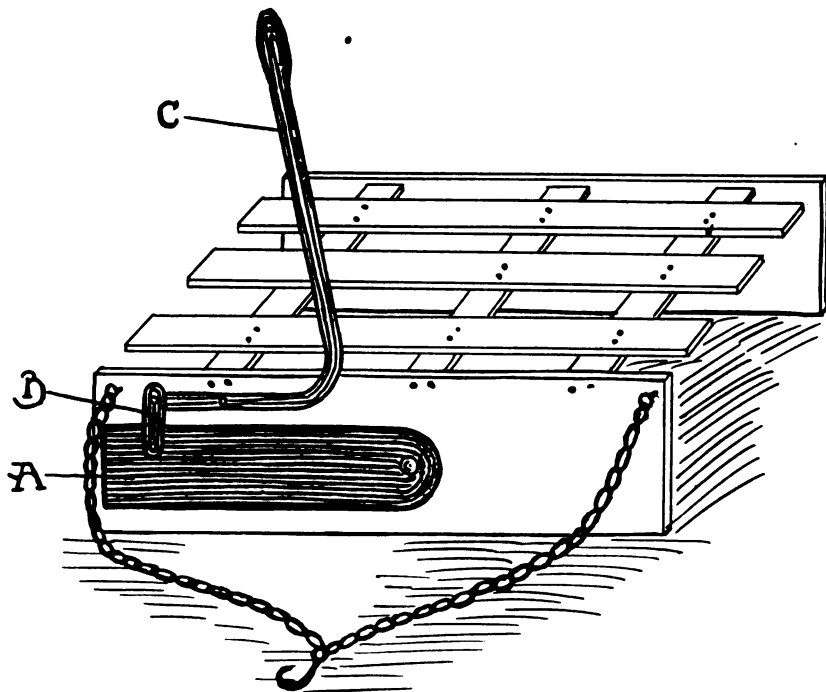
center holds the end of the cutter from dropping down. This attachment has been tested and found to work excellently.

Thoughts On Timely Topics

BY THORNTON

Caustic Censure and Cheery Comment

"QUICK TURNOVER?—what d' y'-mean?" asked a general smith with whom I was discussing some business and trade problems the other day; and I've since been thinking that perhaps there are other hoary-headed sons of Vulcan who couldn't tell a quick turnover from a full floating transmission with poppet valve connections. As the shining example of trade intelligence above referred to, said in further discussion of the turnover problem—"What's quick turnover got t' do with it? If I buy a lot of axle grease in pails, and I make twenty or fifty cents on each pail, whether I sell those pails in one month or twelve months I make my profit if I don't cut the price." This is how I demonstrated the turnover principle to that chap—perhaps it will help others. Suppose now, that we sell wagon jacks. We order six of them from our jobber, who bills them at four dollars, or 66 $\frac{2}{3}$ cents each. We won't say anything at all about freight or other charges, so as to keep the matter just as simple as possible. These jacks we put up at a dollar each, thus making a profit of 33 $\frac{1}{3}$ cents on each one. But before we begin to collect any profit we have got to sell four jacks to pay for all we bought. For suppose that but three jacks are sold, and for some reason the other three cannot be sold; we will have received but three dollars toward the payment of the entire half dozen—will be out one dollar on the deal, and have three jacks on our hands. If we sell the entire lot, the day we sell the fourth jack we will pay for all six, and all we sell after that is clear profit. So you see that the profit doesn't begin to pile up until costs are paid, and the quicker you sell the stuff the sooner you begin to count profit. The little package called profit comes out of the box last, whether you sell axle grease or wagon wrenches. Every article sold before you can begin counting your profit, simply gives you back your money, and until you sell the last three or



MR. SHAW SUGGESTS AN ATTACHMENT FOR A ROAD DRAG

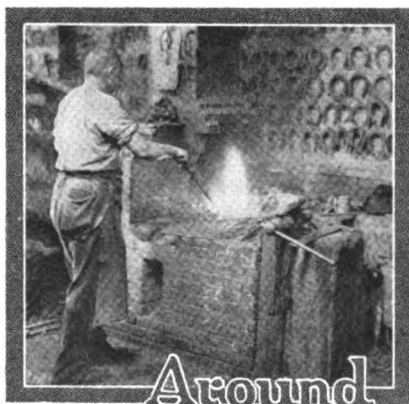


four items you are without profit.

"KEEP AWAY FROM THE HORSES they aren't all gentle" reads a sign we saw in a shoeing establishment the other day. This it appears to us is pretty good advice. It will probably save many a poor misguided yap from sustaining a punctured wish-bone after vainly trying to caress some wild, uncultured brute with a swivel attachment, and a kick like a Gatling gun in either propeller. There are altogether too many folks who have been removed to parts unknown because they edged up too close to an animal that misunderstood their efforts of friendly mediation for a declaration of war; and in such emergencies the horse usually seems to have learned well the lesson taught the average boy—"to put in the first wallop." Of course, if any smith-shop visitor is asking for the quickest way to get to the city hospital, and in addressing you he happens to jog up against some brute that has to be placed in the stocks, nothing need be said. For said visitor will likely connect with the ring-point end of the animal's anatomy, and all the ambulance surgeon need to do will be to carry out the visitor's intentions regarding a quick trip to the hospital. Yes, we believe in signs.

THE AUTOMOBILE press and publicity bureaus continue to spout, sputter and spit as regularly and faithfully as Old Faithful, the well-known geyser of the Yellowstone. To read what these knights of the mightier pen write about the auto and the horse would lead one to think that the haymotor was already on the scrap heap and that the world was merely waiting for the junk man to cart the remains away. I have no desire to belittle the usefulness of the motor vehicle, but when the auto writers try to make folks believe that the horse is getting about as scarce as ripe cantaloupes, it's time to call the traffic cop. The auto is here to stay; there's no question about that; and along some lines the truck is doing good service. But conditions must be taken into consideration. It wouldn't be well for a doctor who found that morphine was an excellent drug for certain ailments, to administer it for every sickness, with the idea of curing everything in the book of diseases. The auto truck and pleasure car are excellent under certain conditions, but they have not

yet been found to be a "cure-all" for all transportation problems. When the auto-publicity fiend writes of how some cities and towns have purchased automobiles and how fine the cars look and how progressive the city or town is, they say "nary a word" about how a 21-thousand-dollar purchase of eleven autos, by Kansas City, sold for a little over 3½ thousand after the cars were in use for two years; and that only tells the story of depreciation—there's not one single word in that said about upkeep and running expense. And, again—remember how the auto-departments of the newspapers howled last winter about the motor trucks and how easily they were plunging through drifts and blizzards? And how the poor horse, even when reinforced by ten and twelve of his husky, faithful breed, could not begin to cope with the cruel elements? Well, something or somebody has been leaking, and for the past several months stories of the real truth have been going the rounds. It seems that horses were repeatedly called to the aid of trucks last winter, and now is announced the type of truck that "fell down so spectacularly last winter." This is evidently for the purpose of warning off the would-be truck-maker who contemplates a campaign against the coming winter's drifts and slush. Let us have the truth first, is what I say, on this motor-vehicle matter.



Around Our Forge Fire

Modern Business Methods and the Smithing Craft

"Say, Mr. Editor!" exclaimed Benton from behind the pages of a copy of "Our Journal" which he was industriously trying to absorb at one sitting. "What's there to this campaign for modern methods? Are you getting results?"

"The best answer I can give you," began the Editor in reply, "is to quote from a few of the letters we've received just recently on this matter of modern business methods," and the Editor took a bulging folder from his desk and continued:

"These letters are from practically all sections of the country and from smiths in practically all lines, from specialty shops to general shops and garages. This first letter sums up the situation in a very finished manner—leaving little or nothing unsaid. I'll read the whole letter; this smith says:

"The things that make for success in the smithing business are good work, modern equipment, fair prices and strict attention to business; and by strict attention to business I mean knowing exactly what is going on in your own business. We read about these things everywhere and in every journal, whether it's a banker's paper or a blacksmith's paper. In every field of business, the same formula is given as the key to success; and when you read about it, all this looks very simple, but the smith who has tried to work out this formula alone and without help will tell you it is all theory and of no real practical help. But, when you come to investigate cases of this kind, you will usually find that the smiths have been applying external remedies for internal troubles.

"If any man had told me a year and a half ago that an investment of what has since amounted to seventeen dollars would place my business on the right road to success I would have turned him over to a keeper for the insane. Now, I know different.

"Of course, you are wondering what I bought with that seventeen dollars. You are wondering what sort of magic a few sheets of Uncle Sam's green goods could buy, in order to place my business on Prosperity Street.

"The answer is given in a very few words—I studied my business and then planned a system that fits into my business like a nut meat fits in its shell. I was at first inclined to laugh at the high-brow business articles that you were running. Then several things struck me very much at home. Your blooming persistency got me to thinking, and now—well, a modern business system and modern business methods have done practically everything for my business that I've been trying to do for years, but didn't know how.

"Through modern methods I have at last gotten my prices where they should be. I am assured of a fair profit. I am able to buy to better advantage. I know just where I stand any day of the month. I know every detail of my business. I don't have to guess any more.

"The blacksmith has for too many years been trying to solve his price and profit troubles at the wrong end of the business. He has tried by means of agreements and bonds and such things to arrange prices on a right basis. You have showed us this is the wrong end of the horn. Of course, associations are all right, and I am boasting ours for all I'm worth, but your articles on business systems and accounting in the blacksmith business have shown me the right road; and the right road to business success is to make prices on a basis of cost and profit for a foundation. Any other basis for figuring is wrong to begin with and a failure in the end."

"That," said the Editor as he finished reading the letter, "is the situation in a nutshell. This blacksmith runs a general business, and has certainly begun to see matters in a different light. Here's another letter from a Middle Western man who says, after telling about his new methods; 'I would go out of business tomorrow if I had to go back to the old guess and rule-of-thumb methods.' And so we could go through all of these letters, Benton. The verdict of the live smith is the same everywhere."

"Will you continue along this line?" asked Benton when the Editor finished. "Are you going to publish more articles on this subject?"

"Continue?" repeated the Editor questioningly. "We are investigating the subject—are carrying on investigations now that will bring to our readers more sound practical matter than we have yet published. It is our intention to help place the smithing business on just as sound a business foundation as any business in the country. This need not mean complications, for we are aiming at simplicity all the time. This coming season should really mean more to the smithing business and the craft in general than any previous season. Some surprising results will be made known very shortly."



The Firm of Grin and Barrett

SAMUEL WALTER FOSS

No financial throe volcanic

Ever yet was known to scare it,
Never yet has any panic
Scared the firm of Grin and Barrett.

From the flurry and the fluster,
From the ruin and the crashes,
They arise in brighter luster,
Like the phoenix from his ashes.
When the banks and corporations
Quake with fear, they do not share it;
Smiling through all perturbations
Goes the firm of Grin and Barrett.
Grin and Barrett,
Who can scare it?

Scare the firm of Grin and Barrett?

When the tide-sweep of reverses
Smites them, firm they stand and dare it,
Without wailings, tears and curses,

This stout firm of Grin and Barrett.
Even should their house go under

In the flood and inundation,
Calm they stand amid the thunder
Without noise or demonstration,
And, when sackcloth is the fashion,
With a patient smile they wear it,
Without petulance or passion,
This old firm of Grin and Barrett.
Grin and Barrett,
Who can scare it?

Scare the firm of Grin and Barrett?

When the other firms show dizziness,
Here's a house that does not share it.

Wouldn't you like to join the business,
Join the firm of Grin and Barrett?
Give your strength that does not murmur,
And your nerve that does not falter,
And you've joined a house that's firmer
Than the old rock of Gibraltar.
They have won a good prosperity;
Why not join the firm and share it?
Step, young fellow, with celerity,
Join the firm of Grin and Barrett.
Grin and Barrett,
Who can scare it?

Scare the firm of Grin and Barrett?

Farm Implement News.



Heats, Sparks, Welds

Be a self-starter—don't wait for someone to crank you up.

Success is merely a matter of profiting by the fewest mistakes.

When a customer finds real service at your shop he will come again.

If you see that you cannot give full service on a job, don't accept it.

Appetite, digestion and ambition: all intangible but very valuable assets.

You forestall kicks by telling the customer beforehand what his job will cost him.

The chap who can paddle his own canoe will soon know how to run a steam yacht.

Most of us get what we deserve, but only the folks who are successful will admit it.

Si Clone says: "Mebbe some fellers ain't earnin' their salt 'cause they don't like it."

The hard thing about succeeding is that no one is particularly interested in your ambition but yourself.

Some folks are so insistent upon "Safety First" that they are afraid of cutting their fingers on the corners of a square deal.

A smith is not judged solely by the company he keeps or the cigars he gives away, but by the quality of work he turns out.

The Appreciation League has just been organized to make courtesy "epidemic." Business courtesy will now be a realized asset.

Trusting some men is all right, provided you trust them with the right thing. Takes a smart man to know where to draw the line, sometimes.

How's your herd? Is your supply low? Don't wait until you are entirely out. Send for a new lot, now—use them freely—ask freely—they're free to you.

Do you know that horses have practically doubled in value in the past five years? Have your shoeing prices increased any during that time? Better do something, hadn't you?

The scientific curiosity of today often becomes the trade necessity of tomorrow. Men and methods change. The logical man needs his trade paper and gets that trade development first.

Do you know what it really costs you to shoe a horse—to set an axle—to put on a new tire—or to replace a plow part? You'll not know your profits until you know your costs. Don't guess—know!

Because one man may be lucky enough to have a poor grade of material prove successful, don't you trust to luck, too. Play safe; let the other fellow trust to luck and see where he lands, ultimately.

"I can stand anything" has killed more people than "I didn't know it was loaded." After the busy summer season don't you think you need a rest? Or perhaps the lady of the house hasn't had her vacation?

\$1.14 for each of the hundred million people in the United States was reclaimed last year in old tin cans and hardware. That scrap heap of yours must be worth something. Look it over, and then get rid of it.

Of course, you know THE AMERICAN BLACKSMITH—you know it comes to you every month—you read it—but is that all you know about it? Turn to the "Timely Talks" page, and read "The Important Thing."

A French scientist estimates that seventeen thousand tons of gold have been taken from the earth within historic times. The amount of iron produced daily nearly equals this huge figure, so you see iron is still pretty important.

"Don't worry—war or no war—freight rates or no freight rates—tariff or no tariff—baseball or no baseball—grape juice or champagne—the farmer is still on the job. Don't forget him." Says E. C. Simmons, of hardware fame.

Electric lamps are being lighted by the wireless method, according to experiments being carried on by Marconi. A specially-designed bulb has been lighted by wireless waves supplied by a plant six miles distant from the bulb.

It's the chap who's there with the bang that pounds out the runs. It's not accident or luck that enables him to do it, but grab-

bing the opportunity when he sees it. Be ready when the right one comes across, and then bang out a homer.

It's not so much the capital but the "turn-over" that counts in the business world of profit. It's a matter of turning over the stock capital once or more than once. The oftener you turn it over in the course of a year the greater the profit.

An automobile which is controlled entirely by hand levers has been designed for the use of persons whose lower limbs are disabled. The usual clutch and brake pedals have been replaced by hand-operated levers attached to the steering column.

A wide-awake smith we know showed us a new stunt that he says "seldom fails to bring home the bacon." When a customer runs a bill long enough to necessitate drastic action, he rubber-stamps this upon it:

"What would YOU expect US to do

If WE owed YOU this account?"

Just to prove he could "come back," John H. Miller of Pennsylvania, aged 86, recently shod a horse "all 'round." He fitted and nailed the four shoes like a "two-year-old." Mr. Miller attributes his health to the exercise he got at his trade of smithing. Who said shoeing wears a man out?

"No, Sir-ee," stubbornly insisted Tom, when a friend invited him to take a ride in the friend's new auto. "Them there fool-killers hev edged me out of some good horse-shoeing business and I ain't never goin' to ride in one if I know it." And Señor Tardy went back to his nail keg and to his whit-ting.

"I hadn't a dull moment from the time I learned to swing a pick without jabbing it through my foot," declares the man who left a white-collared clerkship to hire out to a section gang, and is now President of the New York Central. He didn't look at the small beginning; he didn't even see the finish; he was rewarded as he developed.

Three new Trans-Atlantic liners—the "Britannic," the "Aquitania," and the "Vaterland,"—now being built, represent an investment of twenty-five million dollars. Their average passenger-capacity is over 3,000 persons, while they employ crews of 1,000. The wireless range of these giants is about 2,000 miles. The largest ship, the "Vaterland," is 950 feet long and is said to be the largest structure ever floated.

Yes, it costs more to live today—but, isn't it worth more? The "good old times" were all right for the "good old days;" but these days are better and things are progressing. Despite what the pessimists have to say, conditions are generally better. Our own good craft for example is progressing. It is in better condition and it will be still better. Yes, living is worth more today; and just remember that when giving a price on your next job.

Here's a good stunt we heard of the other day. A general smith, who had built one or two wagons during the dull season, photographed one of the wagons—it was a grocer's top delivery—and after making several prints he tinted them neatly, painted the name of a grocer or butcher on each print in the top panel of the wagon, and sent them out to the merchants whose names appeared on the wagons. This progressive vehicle man is today working on six wagons ordered as a result of his little photographic scheme.

The barber isn't content to let you go out with merely the shave or the haircut for which you came in. The modern drug store solicits your trade on other things beside medicines and prescriptions. Why not get a bit of the same business activity into your shop? Push those lines upon which you make a good profit. How about pad shoeing? Couldn't that end of your business stand a big increase?



Our Honor Roll

Twenty-Seven New Names

And still "Our Honor Roll" continues to grow. Twenty-seven new names are added this month, and the 1924 Class is still growing.

Better get into this list, Mr. Reader—not merely to get your name on this page, but to save money. It's worth something to us to have you subscribe at one time for a long period—and therefore we make it worth something to you.

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NAME	Subscription Paid to	NAME	Subscription Paid to
THE FIX-IT SHOP, Utah.....	July, 1935	P. FREDERICKSEN, Iowa.....	Nov., 1922
W. C. WATT, Kan.....	Dec., 1930	L. O. LEITERS, Ill.....	Nov., 1922
WADDINGTON FARM, W. Va.....	Mar., 1928	W. LAWSON, N. Z.....	Nov., 1922
I. J. STITTE, N. J.....	Jan., 1928	W. O. GRANT, Cal.....	Oct., 1922
E. PRICE, Ill.....	Feb., 1925	W. H. MILLER, Iowa.....	Oct., 1922
J. H. DAVIS, Cal.....	Dec., 1924	A. O. MARTIN, Idaho.....	Sept., 1922
H. L. FENTON, N. Mex.....	May, 1924	O. A. MORTIMORE, Idaho.....	Sept., 1922
J. CARL, Iowa.....	May, 1924	H. J. WYATT, Wash.....	Sept., 1922
J. E. LITTLE, Penn.....	May, 1924	J. N. SKOW, Iowa.....	Sept., 1922
W. E. PARR, Iowa.....	Apr., 1924	A. D. STANDFORD, Wash.....	Sept., 1922
F. SHAMKE, Neb.....	Apr., 1924	T. TENKIEWITZ, Que.....	Sept., 1922
L. A. HULEN, Cal.....	Apr., 1924	A. PLEIFFER, Ohio.....	Aug., 1922
A. HULTSTRAED, N. D.....	Mar., 1924	W. D. VALENTINE, Iowa.....	Aug., 1922
W. F. RISKE, Wis.....	Mar., 1924	G. HOFFMAN, N. Y.....	July, 1922
B. F. SEIBERT, Cal.....	Mar., 1924	J. ERMAN, Ark.....	July, 1922
H. ROESCHWETTER, Mo.....	Mar., 1924	W. K. W. HANSEN, Pa.....	June, 1922
W. B. BRIANT, N. J.....	Mar., 1924	ROBERT TOCHTER, Cal.....	June, 1922
A. BOSCH, N. Y.....	Mar., 1924	J. VAN MARTER, N. Y.....	June, 1922
A. R. JOHNSON, R. I.....	Feb., 1924	E. ANDERS & SON, S. Aus.....	May, 1922
F. JACOBS, Ohio.....	Feb., 1924	LOUISA CARRIAGE WKS., Va.....	May, 1922
A. J. FREY, Ill.....	Jan., 1924	S. SMITH, Tex.....	Apr., 1922
H. D. ERSKINE, Vt.....	Jan., 1924	J. W. HAAR, La.....	Mar., 1922
E. G. WALKER, Cal.....	Jan., 1924	E. A. DILLON, Nev.....	Mar., 1922
E. FOWLER, Pa.....	Jan., 1924	D. W. SMITH, R. I.....	Mar., 1922
BRENN & SON, Ireland.....	Dec., 1923	D. F. KUSTER, Wash.....	Mar., 1922
M. LAMORCAUX, Ohio.....	Dec., 1923	G. F. JOHNSON, Mich.....	Feb., 1922
C. R. DAVIS, N. Y.....	Dec., 1923	R. H. KETTE, Iowa.....	Jan., 1922
F. W. COPELAND, Me.....	Dec., 1923	J. H. ICKES, Penn.....	Dec., 1921
J. L. TOMLIN, Kans.....	Dec., 1923	O. M. JOHNSON, Minn.....	Oct., 1921
H. A. DAVIS, N. Y.....	Dec., 1923	H. FELDUS, Neb.....	Sept., 1921
E. H. TROYKE, Ill.....	Dec., 1923	W. K. KLINE, Kan.....	May, 1921
J. BAILEY, Man.....	Dec., 1923	F. NORRIS, Yukon Ty.....	Jan., 1921
F. WATKINS, N. H.....	Nov., 1923	J. L. JESTER, Mo.....	Jan., 1921
J. KOPFINS, Ala.....	Nov., 1923	T. P. CONSIDINE, Mass.....	Dec., 1920
W. C. LIEBERT, S. Aus.....	Oct., 1923	ED. GRIMM, Tex.....	Mar., 1920
W. B. ABELL, N. Y.....	Oct., 1923	R. S. CRISLER, Ky.....	Jan., 1920
W. R. TURNER, Man.....	Oct., 1923	N. BUCHANAN, Ont.....	Dec., 1919
C. NELSON, Neb.....	Sept., 1923	P. REIF, Ohio.....	Dec., 1919
O. W. TAYLOR, Pa.....	Aug., 1923	R. GUDMUNSON, S. Dakota.....	Nov., 1919
CRAMP BROS., Tas.....	Aug., 1923	R. RAMACHE, N. W. Ter.....	Nov., 1919
L. C. LARSEN, Iowa.....	July, 1923	J. NAIMITTE, N. Zealand.....	Nov., 1919
S. EFFENHAAR, S. Africa.....	July, 1923	A. DISCHER, No. Queens.....	Aug., 1919
G. L. DEWITT, Mont.....	July, 1923	F. UNDERWOOD, S. Africa.....	Aug., 1919
W. W. GREGG, Tex.....	July, 1923	J. T. WILSON, S. C.....	July, 1919
O. C. YOUNG, Mich.....	June, 1923	F. RASS, Saak.....	June, 1919
OTTO SIFFEL, Penn.....	June, 1923	W. H. HOPPER, Cal.....	June, 1919
A. CHAPMAN, N. Y.....	June, 1923	G. JACKSON, Eng.....	June, 1919
C. BIRELY, Md.....	June, 1923	E. G. MULHOLLAND, Me.....	June, 1919
F. H. SHUPP, Penn.....	June, 1923	VINCENT & DUNCAN, S. Afr.....	June, 1919
J. C. STOVER, Penn.....	Apr., 1923	C. H. MCCORMACK, Kan.....	May, 1919
W. SCHOONOVER, Penn.....	Apr., 1923	M. DUBOISE, Miss.....	May, 1919
J. B. RUNNIE, Iowa.....	Mar., 1923	CLYDE ENGINEERING CO., N. S. W.....	Apr., 1919
LOWMEYER BROS., Mo.....	Mar., 1923	A. THOMPSON, Fiji Islands.....	Apr., 1919
J. CARSWELL, Ark.....	Mar., 1923	THEO. PASCHKE, Neb.....	Apr., 1919
G. E. GLAZIER, Ohio.....	Mar., 1923	I. M. TOWNSEND, Cal.....	Apr., 1919
T. BRADLEY, N. S. Wales.....	Mar., 1923	G. BISE, Fiji Islands.....	Apr., 1919
G. FATH & CO., S. Africa.....	Mar., 1923	G. D. GAMBLE, Mass.....	Apr., 1919
I. T. NEEDHAM, Ill.....	Feb., 1923	G. INGRAM, Va.....	Apr., 1919
G. C. DISINGER, Miss.....	Feb., 1923	F. WEBER, Tasmania.....	Mar., 1919
J. HUGHES, Ohio.....	Feb., 1923	WYPER BROS., Queens.....	Mar., 1919
J. WIEBER, Minn.....	Jan., 1923	A. ROGERS, N. Y.....	Mar., 1919
Z. A. ENOS, Kan.....	Jan., 1923	P. W. FOSSETT, Me.....	Mar., 1919
W. G. WIER, Cal.....	Jan., 1923	C. HUBMAN, Colo.....	Mar., 1919
F. S. BISHOP, S. Africa.....	Jan., 1923	ONONDAGA FORGE CO., N. Y.....	Mar., 1919
S. P. HARNETT, Mont.....	Dec., 1922	A. F. BOWMAN, Ohio.....	Mar., 1919
W. BRECKNER, Okla.....	Dec., 1922		
J. PABIAN, Neb.....	Dec., 1922		

NAME	Subscription Paid to	NAME	Subscription Paid to
C. WILLIAMS, W. Aus.....	Mar., 1919	OTTO TIEWT, S. Africa.....	Apr., 1918
J. P. MACKIN, N. D.....	Mar., 1919	E. N. HARRIS, N. Y.....	Apr., 1918
E. RAFTZ, Kan.....	Mar., 1919	F. E. SMITH, N. Y.....	Mar., 1918
D. FRASER, N. Z.....	Feb., 1919	FLA. AG. & MECH. CO.....	Mar., 1918
C. T. HASKINS, N. Y.....	Feb., 1919	J. V. FISH, Ill.....	Mar., 1918
N. E. KOCH, Cal.....	Feb., 1919	H. J. FISHER, Mich.....	Mar., 1918
C. W. M. BURROUGHS, N. J.....	Feb., 1919	GEO. SMITH, N. Z.....	Mar., 1918
L. ARSTNER, Ohio.....	Feb., 1919	AUG. HOLMAGEL, Ore.....	Mar., 1918
R. TAYLOR, N. Zealand.....	Feb., 1919	A. E. UEBELING, Wis.....	Mar., 1918
R. STRODE, Ore.....	Feb., 1919	J. C. YOUNG, Penn.....	Mar., 1918
LEHMAN BROS., Ill.....	Feb., 1919	D. C. HOUCK, Ohio.....	Mar., 1918
O. N. BERNINGER, Penn.....	Feb., 1919	JOHN EYER, Neb.....	Mar., 1918
W. HARRIS, S. Africa.....	Jan., 1919	C. H. STITT, Tas.....	Feb., 1918
J. J. BERNHOLM, Cal.....	Jan., 1919	A. E. DELANO, Me.....	Feb., 1918
L. A. TINKING, Kans.....	Jan., 1919	J. S. STAPLES, Ohio.....	Feb., 1918
W. S. WAGNER, Tex.....	Jan., 1919	S. J. BOYD, Idaho.....	Feb., 1918
A. MACKENZIE, W. Aust.....	Jan., 1919	J. MOLITOR, Ill.....	Feb., 1918
J. G. GEORLUND, Conn.....	Dec., 1918	F. P. FELLOW, N. Y.....	Feb., 1918
BROWN & SCULLY, N. S. W.....	Dec., 1918	J. W. STEADMAN, Ohio.....	Feb., 1918
A. HOETAD, Minn.....	Dec., 1918	J. P. HOLEAPPEL, Penn.....	Feb., 1918
E. P. HOWES, Mass.....	Dec., 1918	E. N. GATES, Vic., Aus.....	Feb., 1918
C. N. ROBINSON, Vt.....	Dec., 1918	RENTON WAGON WKS., Wash.....	Feb., 1918
F. TRELSGAN, N. J.....	Dec., 1918	WHITING FDT. EQUIP. CO., Ill.....	Feb., 1918
G. F. VINCENT, N. Y.....	Dec., 1918	J. P. KOENIGS, S. Dak.....	Feb., 1918
J. R. CONRAD, Kan.....	Dec., 1918	RICHARD BRENNER, Tex.....	Feb., 1918
A. O. GIBROUX, Mass.....	Dec., 1918	W. F. HILL, N. C.....	Feb., 1918
A. A. MURRAY, Tex.....	Dec., 1918	O. O. GODFREY, Wis.....	Feb., 1918
C. W. BRAKE, Mich.....	Dec., 1918	M. C. BETTIS, Tex.....	Jan., 1918
J. DUBENDORF, Penn.....	Dec., 1918	P. SHIRMIN, Cal.....	Jan., 1918
G. F. LAUGHLIN, Ill.....	Dec., 1918	J. B. BETTEL, Me.....	Jan., 1918
L. M. PIATT, Penn.....	Dec., 1918	W. MISCALE, Queens, Aus.....	Jan., 1918
F. BORCKMAN, Ill.....	Dec., 1918	S. PORTERLANC, Que.....	Jan., 1918
W. H. HABERMEHL, Iowa.....	Dec., 1918	B. C. FOLEY, Cal.....	Jan., 1918
E. T. MARSHALL, Wis.....	Dec., 1918	GLEASON BROS., La.....	Jan., 1918
F. HOOPENGARDNER, Md.....	Dec., 1918	C. E. KRUG, Wis.....	Jan., 1918
HEBER TECH. INST., N. Y.....	Dec., 1918	G. E. WOODARD, Kan.....	Jan., 1918
G. E. WINCHESTER, Cal.....	Dec., 1918	P. J. DALLY, W. Aus.....	Jan., 1918
F. T. GRIHAM, Ark.....	Dec., 1918	J. MORROW, Penn.....	Jan., 1918
W. TAIT, N. Zealand.....	Nov., 1918	J. MOORE, N. S.....	Dec., 1917
A. LARSEN, N. Z.....	Nov., 1918	J. S. JOHNSON, Iowa.....	Dec., 1917
R. E. RUSSELL & SON, Penn.....	Nov., 1918	C. W. MUNROE, Mass.....	Dec., 1917
H. SCHAFFER, S. Dakota.....	Nov., 1918	O. HOGA, N. D.....	Dec., 1917
D. MACDONALD, N. S. W.....	Nov., 1918	G. W. MILLER, Penn.....	Dec., 1917
C. A. RITCHIE, Scot.....	Nov., 1918	G. M. SETTMOUR, Ill.....	Dec., 1917
T. E. SANDERS, Eng.....	Nov., 1918	J. TRAMPTON, Scotland.....	Dec., 1917
G. E. HARGREAVE, N. Y.....	Nov., 1918	F. PROCTER, Tas.....	Dec., 1917
W. VALLANCE, N. Y.....	Nov., 1918	J. G. JOHNSON, Ill.....	Dec., 1917
C. ZIERKE, Iowa.....	Nov., 1918	F. E. EGLERS, Ohio.....	Dec., 1917
CYCLONE GATE & FENCE CO., S. Africa.....	Oct., 1918	C. T. FORREST, Cal.....	Dec., 1917
W. ALSON, Minn.....	Oct., 1918	THEO. BUSH, N. Y.....	Dec., 1917
H. P. BOWERMAN, N. D.....	Oct., 1918	J. T. ELLIOTT, Ill.....	Dec., 1917
J. DELANE, Neb.....	Oct., 1918	J. VOELFEL, Ill.....	Dec., 1917
P. DEVERNEY, Vict.....	Oct., 1918	W. J. MAIN, Cal.....	Dec., 1917
H. C. HENDERSON, Queens, Oct.....	1918	J. G. LAUER & SONS, Mo.....	Dec., 1917
J. ELBY & SONS, S. Aus.....	Oct., 1918	Mess Bros., Victoria.....	Dec., 1917
J. E. MATTHEWS, Eng.....	Oct., 1918	E. BLOOMER, Aus.....	Dec., 1917
MUNRO & CO., N. Z.....	Oct., 1918	I. N. PITZER, Ore.....	Dec., 1917
D. R. WINTON, N. S. W.....	Oct., 1918	W. A. RAAGAN, Pa.....	Dec., 1917
E. SCHRAFFEL, S. Aus.....	Oct., 1918	H. P. ADAMSON, N. Zealand.....	Dec., 1917
A. QUAY, S. Africa.....	Sept., 1918	C. E. REYME, N. Y.....	Dec., 1917
J. WILKINSON, Queens.....	Sept., 1918	J. H. ROBERTS, Mich.....	Nov., 1917
GRIMLEY, LTD., N. S. W.....	Sept., 1918	G. E. BARTLELL, Wash.....	Nov., 1917
C. E. BIRELY, Md.....	Sept., 1918	F. FROELICH, Tex.....	Nov., 1917
J. F. BAGGETT, Queens.....	Sept., 1918	J. A. SHEPARD, N. Y.....	Nov., 1917
J. THORNTON, N. W. Ter.....	Sept., 1918	McMILLAN, HEAD & CO., S. Africa.....	Nov., 1917
W. A. THUGE, Queens.....	Sept., 1918	C. ANDERSEN, Queens.....	Nov., 1917
A. L. VARRIE, S. Africa.....	Sept., 1918	J. KILGOUR, Scotland.....	Nov., 1917
GEO. A. PETTY, Utah.....	Sept., 1918	F. R. TOMLINSON, Kan.....	Nov., 1917
G. W. HAZLETT, Pa.....	Sept., 1918	KATE & AINLEY, Eng.....	Nov., 1917
C. WALTER, Ore.....	Sept., 1918	T. H. ZIGLER, Wis.....	Nov., 1917
T. B. HOLT, Okla.....	Sept., 1918	SCHOLLER BROS., Ind.....	Nov., 1917
ROBERT COOK, Ky.....	Sept., 1918	E. M. WURSTER, Mich.....	Nov., 1917
A. B. WENDLANDT, Wash.....	Sept., 1918	S. Z. FREY, Ind.....	Nov., 1917
A. J. BROCKMAN & CO., Vic.....	Sept., 1918	B. A. STEINKE, Ohio.....	Nov., 1917
PETER COCKS, W. Aus.....	Sept., 1918	J. N. BATEGATE, N. Dak.....	Nov., 1917
R. J. TOMPKINS, Texas.....	Sept., 1918	W. H. HOUTGTON, Penn.....	Nov., 1917
J. VASCHETTI, Colo.....	Aug., 1918	C. W. BOOKE, La.....	Oct., 1917
E. C. PUXTON, So. Aus.....	Aug., 1918	G. R. WALTERS, Ill.....	Oct., 1917
V. D. SIBLEY, B. C.....	Aug., 1918	S. SMITH, S. Aus.....	Oct., 1917
L. SMITH, Cal.....	Aug., 1918	W. STEPHEN, Queens.....	Oct., 1917
W. CHIBB, Queensland.....	Aug., 1918	W. T. CUTKOMP, Iowa.....	Oct., 1917
GEO. REID, S. Africa.....	Aug., 1918	GEO. POTTSCHKE, Mo.....	Oct., 1917
H. KELENBERG, N. J.....	Aug., 1918	J. W. RAPS, N. Y.....	Oct., 1917
W. D. BRADFORD, Cal.....	Aug., 1918	W. C. RONEY, Penn.....	Oct., 1917
T. H. GRAHAM, Vic.....	July, 1918	J. N. MILES, Ky.....	Oct., 1917
GILBERT BROS., S. Aus.....	July, 1918	C. L. THOMPSON & SON, N. S.....	Oct., 1917
GEO. DASH, N. Zealand.....	July, 1918	EMIL PLATE, N. D.....	Sept., 1917
C. R. OLIVER, S. Africa.....	July, 1918	F. STAUB, Ohio.....	Sept., 1917
L. G. REID, S. Africa.....	July, 1918	B. T. LARSON, Minn.....	Sept., 1917
W. M. PURYEAR, Ala.....	June, 1918	H. SCHOONOVER, N. Y.....	Sept., 1917
THOM & VERSTEE, S. Africa.....	June, 1918	PERFECTION SPRING CO., O.....	Sept., 1917
L. LACASTE, Que.....	June, 1918	W. A. WILSON, N. Z.....	Sept., 1917
WRIGHT & SON, Texas.....	June, 1918	R. ROSS, N. S. Wales.....	Sept., 1917
ALBERT MELLUM, N. D.....	June, 1918	I. E. SPROUT, Me.....	Sept., 1917
J. LINDSAT, S. Africa.....	June, 1918	FRED. BLOHM, Tex.....	Sept., 1917
J. H. GIBBS, S. Africa.....	June, 1918	R. E. MATTOX, Va.....	Aug., 1917
W. W. BRIDGES, Ark.....	June, 1918	C. T. WOOD, Kans.....	Aug., 1917
MATHERSON BROS., Iowa.....	May, 1918	GEO. B. HEATON, N. J.....	Aug., 1917
ED. HOLLAND, Queens.....	May, 1918	CLARK & FAUBERT, Queens.....	Aug., 1917
H. L. HASWELL, N. C.....	May, 1918	C. L. HOCKETT, Cal.....	Aug., 1917
CHRISTENSEN BROS., Cal.....	May, 1918	H. C. STENDEL, Tex.....	Aug., 1917
W. H. COLLETT, S. Africa.....	Apr., 1918	M. DEJAGER, S. Africa.....	Aug., 1917
G. F. BRACKETT, Wash.....	Apr., 1918	F. HOWARD, Kan.....	Aug., 1917
E. KOEPEL, Wis.....	Apr., 1918	H. FERREL, Ill.....	Aug., 1917
J. H. MARTIN MFG. CO., Ind.....	Apr., 1918	J. MCMEIKEN, N. Z.....	Aug., 1917
H. S. WAYNE, S. Aus.....	Apr., 1918	F. H. GIBBS, S. Aus.....	Aug., 1917
H. S. YONGUE, Wash.....	Apr., 1918	A. L. PITTINGER, Ill.....	Aug., 1917
W. WELLSHAUSEN, N. D.....	Apr., 1918	M. OSWOLD, N. Y.....	July, 1917
W. H. CHIPMAN, Mo.....	Apr., 1918	S. ROHRBACH, Pa.....	July, 1917
A. P. STROBEL, N. Y.....	Apr., 1918	H. C. WILLIAMS, Iowa.....	July, 1917
E. H. ALBERT, Pa.....	Apr., 1918	J. B. MILLER, Ohio.....	July, 1917
J. R. JEFFRIES, Pa.....	Apr., 1918	L. M. BROCKETT, Neb.....	July, 1917
R. COLVIN, Ind.....	Apr., 1918		
J. LIPPERT, Ill.....	Apr., 1918		



History and Development of the Anvil—1

JAMES CRAN

While everyone is familiar with the anvil of today, in its high state of development and graceful lines, it is doubtful if very many, even blacksmiths of the present age, would recognize the rough, crude, uncouth lumps of metal of primeval and medieval times as the common ancestor of our present-day anvil.

The history of the anvil takes us back to antiquity, where its origin is lost. That it was used at a very early date is manifest, for, even before the discovery of iron, pre-historic man used an anvil of stone upon which he chipped and shaped his spear and arrow heads of flint.

The writer had the pleasure of seeing one of these pre-historic anvils which was discovered many years ago in the north of Scotland while some excavations were being made. The anvil, a large, irregular block of yellow flint one side of which had been chipped and worn to a comparatively level surface, was found amidst a heap of flint chips, arrow and spear-heads, some of which were neatly chipped and finished, while others seemed to be only blocked out.

To follow the history of the anvil it is necessary to go back to the time when copper and bronze were the metals in common use. Having ample proof that the ancients were familiar not only with the art of casting copper and bronze but of forging them into tools and weapons, which they hardened, it is therefore safe to assume that the first metal anvils were of copper or bronze, probably alloyed with other metals and hardened. Research has failed to bring to light any anvils of copper or bronze, but there seems to be little doubt about their having been used.

No definite date can be assigned to the first knowledge of iron, but the earliest hieroglyphics to which an accurate date can be fixed, the pyramid texts of the fourth millennium B. C., prove beyond question that iron was well known in Egypt and was forged into instruments, weapons and tools. It would seem, however, that for a period of about 3000 years its existence remained more or less in obscurity, as it is not until the time of Homer, 880 B. C., that noticeable attention was given to iron. At

that time it must have been considered of less value than bronze, from the fact that objects dug up from the mounds of Nineveh, of about the time of Homer, many were composed of cores of iron around which bronze had been cast.

Dr. Percy, in referring to the finds from the mound of Nimrud, says the Assyrians were well acquainted with iron, as is clearly established by the

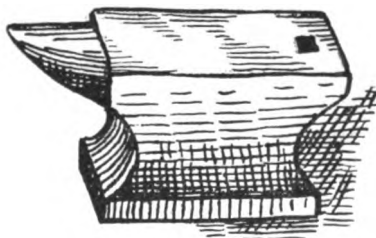
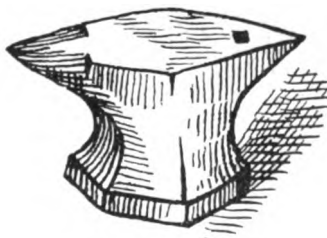
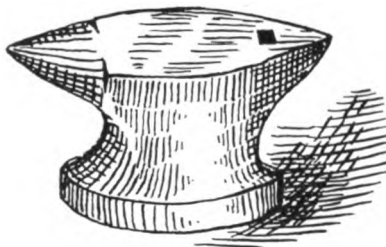


FIG. 1.—THE TAILS AND HORNS OF THE EARLIEST ANVILS WERE VERY SHORT

explorations of Lyrad, who has enriched the collections of the British Museum with many objects of iron of the highest interest from Nineveh. Amongst these worthy of particular attention may be mentioned tools for the most ordinary purposes—as picks, hammers, knives and saws, which could be of a date not possibly later than 880 B. C. The fact of iron having been applied to such ordinary tools as hammer heads, for which bronze might have been a fairly good substitute, would clearly indicate that by

that time, for tools at least, iron had superseded bronze.

A few centuries later, Thucydides describes a chain of iron made use of by the Plateans, during the siege of their city by the Thebeans, 429 B. C., which was used to suspend beams which were dropped so as to break off the heads of battering rams brought up against their city.

Quoting Pliny the elder, in recounting the treaty which Porsena granted to the Roman people on the expulsion of the kings, 509 B. C., there was a specific provision that iron was not to be used except in the pursuits of agriculture, and the most ancient authorities have preserved the fact that it was at that time that writing with a bone style came into practice.

Besides the literary evidence of iron having been used at an early date by the Romans, we are not without actual samples. At the Saalburg near Homburg, Germany, which was built and inhabited as a Roman fortress between 11 B. C. and 274 A. D. there is still preserved the iron chain and its hook which were used to raise water from a well. It is claimed that the chain is welded and beautifully made.

The use of iron and the anvil being synonymous is the only reason for the writer having gone so far into the early history of iron and having said so little of the early history of anvils. Actual specimens of the very earliest anvils are so rare that their size and shape is more or less a matter of conjecture.

Julius Caesar mentions, that when he invaded Britain, 55 B. C., the currency of the people consisted partly of iron rings adjusted to a certain weight. Thus at the beginning of the Christian Era we find that both the Romans and the Britons had long understood the working of iron.

Up to and for several hundreds of years after the beginning of the Christian Era nearly all objects of iron, including chains, were of square or rectangular section. This may be accounted for by the fact that iron is easier to draw down from a lump by hammering on an anvil into flats, squares and rectangular sections than to any other shape. It would also indicate that in early blacksmithing, few if any tools were used other than anvil and hammer, and that the anvil itself had not been developed beyond



the type at present used by saw-makers, i. e., a rectangular block without the overhanging tail or horn. The tails and horns of the earliest anvils were of the most rudimentary character, often barely extending over the base, as may be noted by referring to sketches of early anvils shown in Fig. 1. There is no question about the art of smithing and the anvil having developed simultaneously.

From the 12th to the 17th century, smithing all over Europe reached a stage bordering upon perfection, but no attempt was made to standardize the shape of the anvil. The reason for this would seem to be that as a rule every smith was his own anvil-maker, and an anvil being a piece of equipment that lasts a lifetime or over, it stands to reason that there

following them came M. and H. Armitage who operated the forge for over 100 years. The present owners, Brooks & Cooper, have run the works for upwards of 38 years, and are still making anvils that are hard to beat either in quality, shape or workmanship. Although there are now a number of concerns making anvils, both in England and America, the Mousehole Forge is unique in several respects. They were the first to specialize in anvilmaking, they were the first to make any attempt at standardizing the shape of the anvil and they operate their forge to this day with no other power than that developed by an old-fashioned water wheel.

For well over a century there has been practically no change made at the Mousehole Forge. The same old-fashioned helve hammer, or "metal

this the steel face was welded on in sections. The anvil was then trimmed and finished to the desired shape by the use of hand tools. The face was then ground and hardened and, after hardening, the face was again ground and the anvil then received the finishing touches. Some idea of how well this work was carried out, may be had by referring to Fig 2, which shows a group of standard patterns of Mousehole anvils.

The Blacksmith as a Money-Maker

P. V. BURGESS

I wonder why we so often hear the remark, "Why is it that so few blacksmiths save any money?" For my part, I don't think this rule applies so forcibly to the general run of present-day blacksmiths as it did some years ago. I am personally acquainted with a great many in the trade in this location (Western Missouri), and while it is true in a good many cases that they have not acquired the habit of saving their money, generally speaking they are in a fairly prosperous condition and can class as well as any as money-makers.

Why not? Hasn't the blacksmith as much right to be alert and thrifty as any other mechanic? Shouldn't he have just as much right to turn deals in real estate as the next one? Why can't he sell an auto, a gas engine, a corn sheller, grinding machines or anything else that the community may need?

Now, Brother Blacksmith, just a word in this connection; this extra money will not come to you without an effort on your part. If you want more business, you must go after it and endeavor to get it. Be just as aggressive as any business man in your town. Possibly some will say: "I will attend to my blacksmithing and leave this other business alone." You may be a good smith all right, and you may be getting your share of the business and a little more. But, is your time entirely occupied? Don't you have a little spare time now and then? Is this spare time spent in playing checkers, pitching horseshoes, talking politics, discussing the crops, and so forth? Permit me to say that you had better employ your time as previously stated by endeavoring to sell some useful article to one of your good customers.

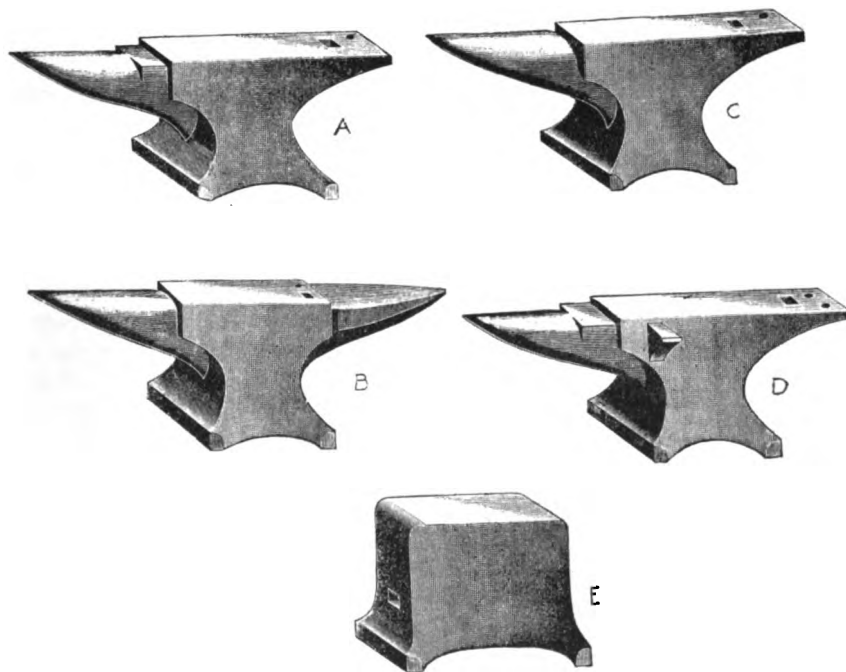


FIG. 2—STANDARD PATTERN MOUSEHOLE ANVILS: A, THE LONDON SHAPE; B, THE DOUBLE PIKED; C, COACHSMITH'S; D, FARRIER'S; AND E, SAWMAKER'S ANVIL

were few if any expert anvilmakers in the Middle Ages.

Anvilmaking as an industry was first started at the Mousehole Forge, Sheffield, England. How long ago there is no authentic record, but for well over 200 years anvils have been made for the trade at the Mousehole Forge, which for two centuries, at least, was the only works of its kind in the world. The first of whom there is a record of having operated the Mousehole Forge in anvilmaking is the family of Sir John Burgoyne. Then Cockshutt & Armitage, and

helve" as it is locally termed, is still doing duty and is operated by the already mentioned water wheel. The building itself, with its old-fashioned solid stone walls and low arched windows and doorways, shows but slight signs of the ravages usually worked by time, and are apparently good, barring misfortune, for centuries to come.

Originally Mousehole anvils were made by the building-up process, that is, the corners of the base or feet, the horn and the tail or heel were welded on to a centerpiece. After



It will surprise you to see how much influence you have in your community if you will only associate with the right class of people. This is not theory, but facts that have been demonstrated in my own case. I have made extra money on the side, and you can do the same. But this business is not going to hunt you up; you must dig in and get your share while the other fellow is getting his.

Electroplating: Theory and Practice—3

E. V. S.

Polishing Lathes and Wheels

A polishing lathe is indispensable to the electroplater. Fig. 7 shows an easily-constructed foot-lathe, made principally of bar-iron. The majority of shops undoubtedly have an emery grinder which is operated by power.

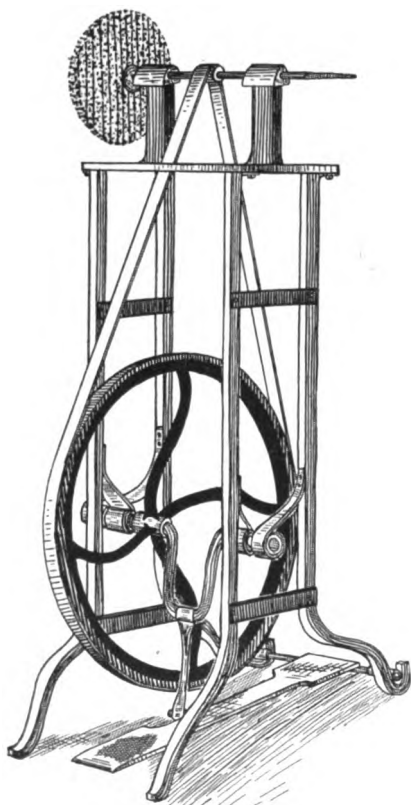


FIG. 7—AN EASILY-MADE FOOT LATHE OF BAR IRON

This can be used for a polishing lathe, and the various types of wheels used in polishing changed from the one spindle. However, if a great deal of work is to be done, a lathe as illustrated at Fig. 8 will save time and money. It is equipped with two spindles that are standard size for all the polishing wheels, and is built especially for the work.

Besides the emery wheel, a number of special wheels are necessary in bringing the work to the desired point of smoothness. The wheel illustrated at Fig. 9 is a leather-covered wood wheel; it is made by gluing four pieces of wood with their grains crossing, and then turning it out to circular form. The center hole carries a brass boss to fit the spindle or a plain hole to fit between the collars. Around the edge is securely fixed a thick piece of buff leather; meeting with butt edges. The leather is put on the wheel with good hot glue. After drying twelve hours, the abrasive (emery, sand or tripoli) is spread on paper, and the rim of the buff first rolled in hot glue and then in the powder until the coating is of sufficient thickness. A number of these buffs should be made; not only for reserve but coated with different grades of emery: Nos. 60, 80, 120 and 140.

There are articles upon which it is impossible to reach all parts—such as cycle-frames, handle-bars, auto-parts, etc.; and an emery belt machine is a great aid. Fig. 10 illustrates one, but they can easily be home-made and attached to the emery grinder.

The leather-covered wheels make splendid "grease" wheels, as they are known, i. e., wheels that have the cut of the emery worn off. For removing the scratches left by the foregoing wheels, revolving mops, known as "dollies," are used. They are made chiefly from thin, tough leather and from various grades of unbleached calico. They can scarcely be made by the novice and had better be purchased. Fig. 11 shows a walrus wheel, A, made from walrus leather, a calico dolly, B, and a muslin mop, C. Tripoli, rouge or crocus powder are used on these wheels.

It must be remembered that all work must be free from scratches and brought to as high a state of polish as possible before plating. The little declivities and irregularities, instead of being filled up by the plate, are really emphasized by the coating. The unalterable truth of electroplating is: The higher the polish before, the brighter the plate after.

Miscellaneous Equipment

Among the miscellaneous equipment may be mentioned: good scales, a clock, several galvanized-iron and wooden pails, thermometer, glue pot, etc. For personal equipment: a

good rubber apron and rubber gloves. When a number of small articles are dipped in the cyanide solution, it is convenient to have a dipping basket of glazed stoneware as shown in Fig. 12. They are inexpensive and save

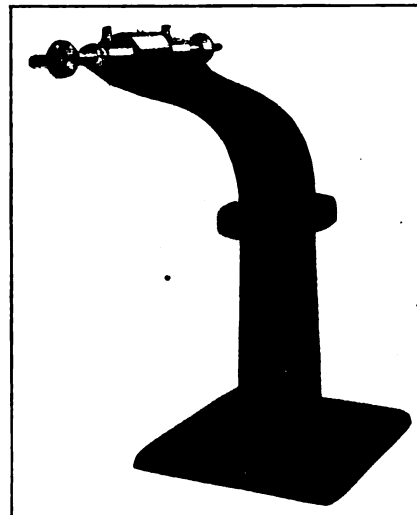


FIG. 8—A DOUBLE SPINDLE LATHE WILL SAVE TIME

a lot of time. In silverplating, it is well to have a couple of wood-fiber brushes (illustrated at Fig. 13, Page 306) to remove the scum or frosty appearance that the article has when coming from the bath. Scratch brushes are used for first buffing after the article is plated; they have nearly the same appearance as the fiber brushes, except that they are made of iron or brass wire or stiff bristle.

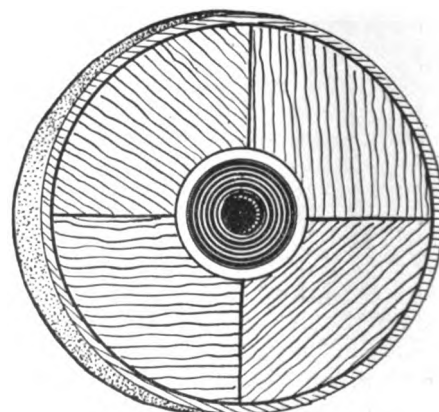


FIG. 9—A LEATHER-FACED WHEEL OF WOOD

Extra polishing wheels may be added as shown at Fig. 14, Page 306.

The Plating Room

Just a word about the arrangement of the apparatus. The polishing outfit, emery grinder, etc., may be placed in the shop where it is handiest to



power, but the wheels should be kept in a dust-proof box when not in use. The plating tanks and cleaning solutions *must* be placed in a separate, dustless room. Furthermore, all tanks must have covers and the room *must be well ventilated*, as the chemicals are dangerous if they gather in any quantity. The tanks should be protected from direct sunlight and all chemicals should be kept under lock and key. The room should be light, so as to observe all operations. The main thing to be kept in mind is that the polishing and plating must not be done in the same room. The temperature of the room should be about 60 or 65 degrees F.

Cleaning the Work

There is no set method of doing this polishing. Authorities and expert workmen differ in their methods. The following is a reliable and logical sequence of operations:

1. Pickle, to remove scale, sand or rust
2. Emery wheel, to remove burrs and imperfections
3. Polishing wheels, set up with glue and emery (various grades)

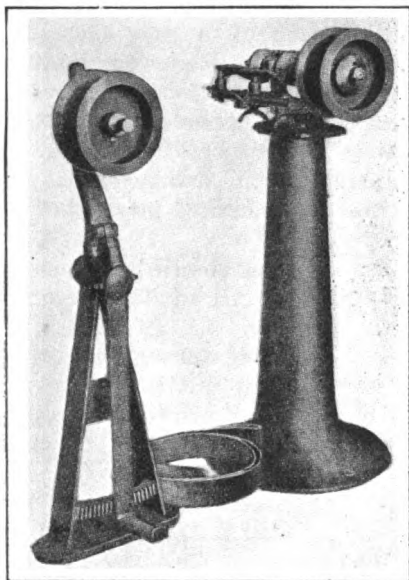


FIG. 10—AN EMERY BELT MACHINE IS A GREAT AID

4. Buff wheel (walrus), to remove scratches left by polishing wheels
5. Coloring (calico "mops"), to produce fine finish
6. Potash dip, to remove grease
7. Rinse in cold water
8. Scour with handbrush and fine pumice stone (on scrubbing trough)
9. Rinse in cold water

10. Acid dip, to remove dust (from iron and steel)

11. Cyanide, to remove oxide (from brass, copper, silver, gold)

12. Rinse in cold water and pass to plating solution *while wet*.

sure of about one volt is used on fair-sized work.

The alkaline solution:

Water	1 gal.
Carbonate of copper	¼ lb.
Carbonate soda	¼ lb.

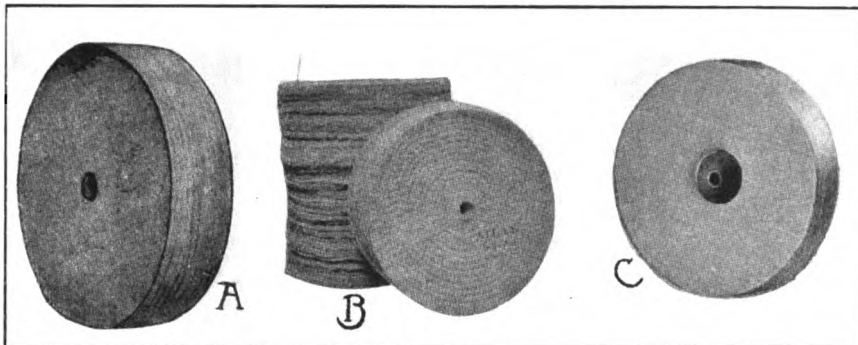


FIG. 11—FOR REMOVING SCRATCHES, REVOLVING MOPS KNOWN AS "DOLLIES" ARE USED

The pickles are as follows: For silver, brass and a few others, 10 oz. of cyanide of potassium to 1 gal. of water with a few drops of ammonia. For copper and zinc, a mixture of 1 part sulphuric acid in 20 parts of water. Strengthen, if it fails to act quickly. For iron and steel, 6 parts sulphuric acid, 1 part muriatic acid and 160 parts water. In this the goods are dipped from 15 to 30 seconds. For the oxides of lead and tin, including Britannia ware, pewter, etc., use the hot lye solution. These pickles should be stored in jugs of vitrified stoneware, as they will eat the glaze from ordinary earthenware and the enamel from iron.

Copperplating

There are two kinds of copper electroplating solutions—the acid copper or duplex solution, and the alkaline or cyanide copper solution. The acid solution gives the better plate of the two; it being heavier, thicker, more durable and cheaper. However, it has the disadvantage of not directly plating iron, steel or zinc. On this account, we give them a light plate of copper from the alkaline solution and then, after rinsing, place them in the acid bath.

The acid copper solution:

Water	1 gal.
Sulphate of copper (blue vitriol)	26 ozs.
Sulphuric acid (by measure —not weighed)	3¼ ozs.

Dissolve the sulphate of copper in the water, then add the sulphuric; stirring it in slowly. A current pres-

Chemically pure (c. p.) potassium cyanide

½ lb.
Add ¼ oz. hyposulphite of soda (known as "hypo") to each gallon of solution for clarifying purposes. First dissolve all the cyanide in nearly the full quantity of water required, then dissolve the carbonate of soda in this. Mix the carbonate of copper in the water held in reserve, until it forms a thin paste; stir this paste in the bulk of the solution, after which add the hyposulphite of soda as a clarifier. A current pressure of about

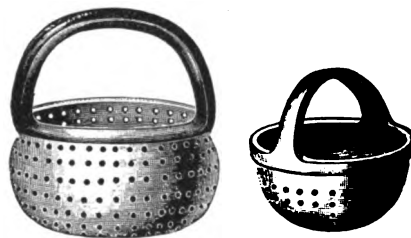


FIG. 12—IT IS CONVENIENT TO HAVE STONWARE DIPPING BASKETS

3½ to 4 volts is used with this solution. The articles are slung on copper wires bent in the form of an "S" and hung on the center brass rod. Anodes of pure copper are hung on either side of the article. Then, as fifteen minutes is usually long enough, take out goods and rinse in hot water and dry in boxwood sawdust. (This to be purchased—it is not ordinary shavings and sawdust.)

Nickelplating

Goods that are to be nickelplated, should first be copperplated—which is necessary for iron and steel, and



best for all metals. They are rinsed after copperplating, and placed directly into the nickel vat. If the article has been nickelplated before, this plating must all be removed. The plate on iron and steel must be

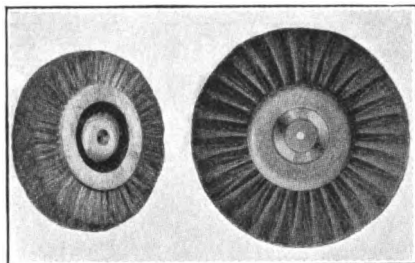


FIG. 13—IN SILVERPLATING, WOOD FIBRE BRUSHES ARE USED

removed by the emery wheels, while the other metals can be stripped in the following bath:

Water ½ gal.
Sulphuric acid (c. p.) 2 gal.
Commercial nitric acid .. ½ gal.

The water is placed in an iron pot and the sulphuric slowly added; stirring with a smooth stick. After this, slowly stir in the nitric. Be careful not to spatter the acids or mixture. Care should be taken not to leave the articles in the bath too long. After the nickel is stripped, as is seen by drawing up the article and inspecting it, it is rinsed in cold water and dried in sawdust.

The nickel "double salt" electroplating solution is made by dissolving ¾ lb. of the double sulphate of nickel and ammonia to a gallon of distilled hot water in an iron kettle. When cool, filter through muslin and pour into the vat. The larger articles are placed in the vat first. Do not attempt to plate different metals at the same time. Pure nickel anodes are hung on the rods. Fig. 15 shows a most scientific form of nickel anode. If these are tied in a light cotton bag, it is claimed a better deposit is obtained. A single tank requires three or four Bunsens connected in series.

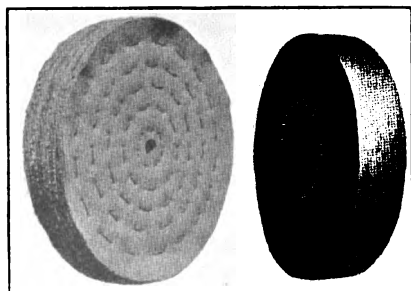


FIG. 14—OTHER POLISHING WHEELS MAY BE USED

The goods are left in the bath two or three hours, according to the work. They should be watched to see that they are working properly and taking on the coat correctly. When the goods have taken on the desired thickness of metal, they are rinsed in the hot water and dried in hot sawdust. Work quickly and be sure the rinsing and drying are thoroughly done, as exposure to the air with the plating solution causes oxidation in the form of blotches that polishing cannot remove.

The goods, as taken from the bath, have a dull-gray appearance, ranging

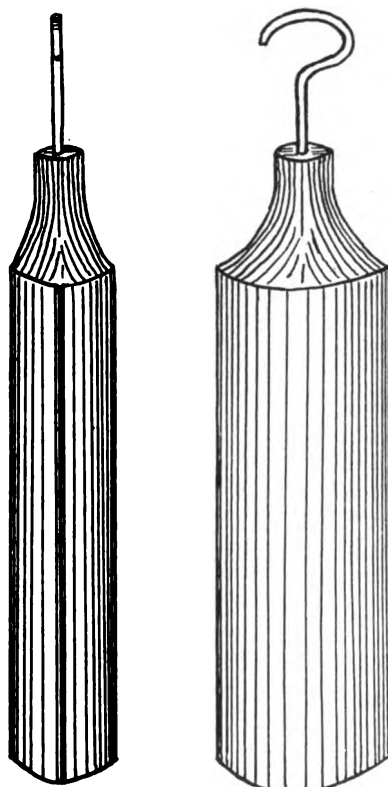


FIG. 15—IN NICKELING, PURE NICKEL ANODES ARE HUNG ON THE RODS

from a creamy-white to a dull-yellowish hue. After thorough drying, they are polished with French rouge on unbleached calico dollies or, better yet, on ones made of muslin. If the coat is refractory in polishing, start on the walrus wheel. Beware of too much "elbow grease" in these operations, as it is apt to cut through the nickel skin.

(To be continued)

A Pressure Regulator for Acetylene Gas

The pressure regulator shown is for use in connection with tanks having a high pressure of oxygen or acetylene. It is constructed (according to

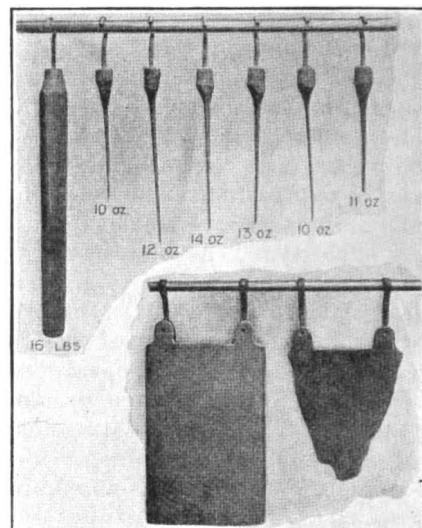
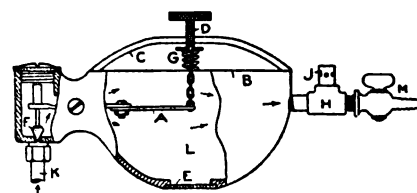


FIG. 16—WHY THE OVAL ANODE OPERATES BEST

an exchange) from a discarded carburetor. The float is removed and an arm, A, is attached in its place. A diaphragm, B, is soldered on top of the bowl to form a gas-tight joint. An arch, C, made of a flat piece of brass, is soldered at the edges, and a hole is drilled and tapped in the center to receive a thumbscrew, D. A piece of brass is soldered over the hole, E. A short piece of chain is fastened to the end of the arm, A, and soldered to the center of the diaphragm, B, allowing enough slack to let the valve, F, open ¼ in. The screw, D, compresses the spring, G, against the diaphragm, B, in making adjustment to obtain the desired pressure of gas to operate the torch. A ⅛-in. tee, H, is connected as shown, and a safety valve, J, is turned into its side outlet.

In operation, the gas enters the pipe, K, passing through the valve, F, into the chamber, L, and through the outlet, M. When the set pressure is reached, the diaphragm, B, closes



AN ACETYLENE GAS-PRESSURE REGULATOR

the valve, F. When the torch is shut off, the valve will be entirely closed. If the regulator is well made, there will be only a slight variation in the pressure used in the torch, regardless of the amount of pressure in the main supply tank.



Queries— Answers— Notes

A Question on Bolt Making.—Can any of our readers tell me the best method of working round bar muntz metal for bolt-making? SAMUEL BUDDS, New Guinea.

Holding Work in a Vise.—To hold a piece of machined work in a vise for any purpose, and to prevent the jaws of vise from marring the surface, place a strip of brake-lining on each jaw and it will hold securely and, regardless of hard pounding and tight squeezing of the vise, it won't scar the surface. T. E. WILSON, Missouri.

Wants a Vulcanizer.—I am thinking of putting in a vulcanizer for auto-casings and tubes. We have about four hundred running cars in my county, and there is no vulcanizer within fifty miles of our city. I am satisfied an outfit would pay well here, and would like to hear from someone through "Our Journal" who has been operating an outfit. Also, which is the best, the steam or electric machine? Kindly give me a little information on this matter.

W. F. BURDELL, South Carolina.

Piece-Work in General Shop.—I would like to hear from some of the readers who have used the piece-work system in their shop or have been employed as blacksmiths in a general shop doing piece-work or who were paid a certain per cent for the work they turned out. A discussion on this subject would be of interest to me and I believe to other readers also. I think more and better work would be accomplished if the employee was financially interested in getting the customer's next job. But where the employer works along with his employees, I wonder how it is managed for mutual benefit. T. E. WILSON, Missouri.

A Young California Smith.—I am a young smith, only had a few months' experience before starting here, but am doing fine. I purchased the shop I am now in last October and have done a good business ever since. The first month I only shod 28 head of horses, while last month I shod 157 head.

Here we get \$2.50 per set of shoes up to and including No. 5; above No. 5, \$3.00 per set. Most of my horses are drivers that take a No. 2 or No. 3 shoe which, of course, makes it much easier for me. In the eight months I have owned the shop I have only used 11 sets of shoes above No. 4. Another shop here has very few horses wearing smaller than a No. 4.

I learned the trade under my father in Colorado and served six years under him.

S. E. CAMPBELL, California.

The Alabama Tornado.—On the 21st of March, 1913, about 4:25 o'clock in the morning, a terrific tornado struck here and completely demolished my home and shop. The

accompanying picture shows how every thing was blown to pieces. All the houses in our little village were blown down, causing eighteen deaths, while many others were severely injured and crippled for life. There were seven in my home at the time; five were crippled, but none killed. I am just now in a condition to do a little work. While the loss of my home and shop was a hard blow, I did not fare as badly as others did. One man who happened to be away from home, on his return the next day found all of his possessions blown away, and his family (consisting of his wife and four children), dead.

I think it would be a good plan if the craft had some kind of an association for us to join that would render assistance under circumstances such as these.

W. B. SHAMBURGER, Alabama.

The Athletic Advantages of Blacksmithing.—I have a little suggestion to make that will undoubtedly interest most smiths. It is concerning the athletic advantages of blacksmithing. I suggest that our readers contribute incidents of the feats of strength that they have seen and heard of. For instance, I know of a blacksmith who could twist a horseshoe in two; and I have heard of another who could twist a spool in two. Fitzsimmons, Joe Goddard, and John Hughes the dangerous blacksmith, are all examples of the benefit of blacksmith occupation. Professor Bernard McFadden, expert on athletics, says that a blacksmith comes nearer using all the muscles than those of any other occupation. Here is an instance in "Our Own Journal" of an old gentleman by the name of Chidester, who died at the age of 80, and was noted for his great strength. Perhaps his sons or relatives could tell some interesting incidents concerning his unusual ability. I for one will contribute to this subject.

W. J. McCORMICK, Illinois.

Some Pointers from Texas.—We have been taking your paper almost since it was first published and consider it the best we have ever come across.

We are located in a good farming country. Have a shop, 30 by 58 feet, with warehouse, 22 by 32 feet, for storing stock plow extras and plumbing goods. We have a four-horsepower engine, a drill, trip-hammer, plow sharpener, emery stand and three forges all run by power. We do not work on autos because they interfere with the favored trade. We have a good trade in plow, reaper, mower and plumbing goods that we find more profitable than the auto business. As a rule, the auto men in small shops are not prospering, because farmers will pass your shop up if they see you on an auto and go where the man is ready to take care of their wants immediately.

There are lots of articles on "home-spun" machinery. Generally speaking, it is a poor makeshift and time and material cost more than if bought direct from the factory. It would be to our advantage to give more

study to the methods of doing jobs with less expense, time and material, but, at all times, good workmanship. Put in a phone, advertise, charge a reasonable price that will insure you a fair profit, and make your word good with all. Observe the methods your competitor employs and, if they seem superior to your own, don't be ashamed to adopt them. Read your trade papers carefully, and put into practice the ideas that will better your trade. Blacksmiths should be able to build a growing business and save a little for old age, but in many instances you will find them from year to year with the pile of old scrap they started with, an anvil, hand tools and a stock amounting to from \$50.00 to \$100.00. Keep endeavoring to secure new trade and it will come your way, but never be a "Tom Tardy." Demand reasonable prices and a fair share of the pleasures of life.

A. E. HEISTER & SON, Texas.

From Zululand.—It occurred to me that it would be interesting to some of the readers to see a letter from Zululand. There is very little to boast of in this district which is confined to sugar-growing and, in my opinion, a very poor one at that, judging from the price we have to pay for sugar. We get very poor prices for smithing work in this part. I am only a working smith here, but have the running of the shop, and we turn over from £30 (\$146.10) to £100 (\$487.00) per month. I am called upon to do all kinds of work, smithing, farriering, wheelwrighting, wagonmaking and plow repairing. The farmers in this vicinity are very poor payers, and competition is very keen. This is an extremely hot climate in summer, averaging 120° F. in the shade.

I would like to see a formula for welding broad tires. I can weld tires up to five inches without difficulty, but when it comes to welding from six inches to eight inches, I am not satisfied with the work when finished.

Also, I would like to know what is the



WHAT WAS LEFT AFTER THE TORNADO PASSED

record of time for a man to shoe a horse all round without any helper, and what is the average number supposed to constitute a day's work (8 hours). I have shod a horse all round in half an hour and have shod fourteen horses in one day. I used to boast of this until recently when I was told that one of my competitors shod thirty-seven horses in a day. At first I doubted the man, but when the statement was corroborated by members of the Z. M. R. I was forced to believe it.



The shop I am managing is 40 feet by 30 feet, and has one fire, two drilling machines, tapping machine, and a few other tools of my own make.

B. O. BIRCH, Zululand.

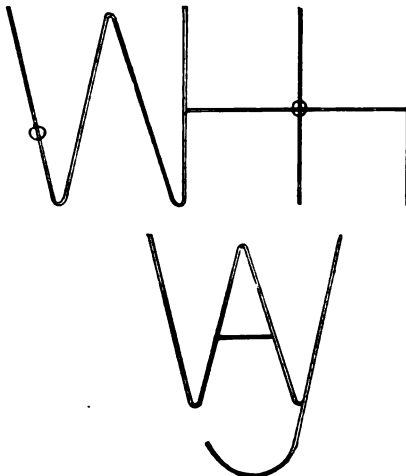
Editor's Note:—For the enlightenment of Mr. Birch, will John Dietschler of Batavia, Harry Wilson of Iowa, J. B. Price of Arkansas, A. H. Jones of Chicago, A. S. Pratt of Batavia, and other "speed marvels" send in their latest records?

The 1,000-Mile Axle.—Making Brand Irons.—In regard to welding the 1,000-mile axle (which appeared in the March number) by Mr. Bell of South Africa, who says he can weld them like shelling peas, it seems to me that he must work in a place where time is no object. It should be remembered that it takes much longer to prepare a V-weld, as shown in the paper, than to prepare an ordinary scarf weld. I have handled some thousand axles from 1- $\frac{1}{8}$ inch to 3- $\frac{1}{4}$ inch steel, including some of the 1,000-mile axles, and find no difficulty in welding them. I use a little of the Laffitte welding plates which are reliable and handy for any size weld. I only need one heat to jump up the ends and one to weld, and I am quite sure that I would have my weld finished before Mr. Bell had his V-scarf ready.

In welding cast-steel drills, I agree with Mr. Bell in that the V-scarf is all right for that purpose, but I would not think of a V-weld on an axle.

As to brand-iron making, I like that work, because some brands are interesting and sometimes requires considerable thinking as to the best way to make them. I generally use Swedish iron on brands that take a bit of work. For instance, Mr. Bell mentions a figure 8. My method is different, in that I just stump on my handle about 8 or 9 inches long (welding on the longer part when finished). I cut up my brand in the shape of an X and the work is then very simple. The face of a brand is usually $\frac{1}{8}$ inch, and about $\frac{3}{8}$ inch on the back and 1- $\frac{1}{2}$ inch deep. The engraving shows two of the many brands I have made and, as you will see, the bottom one represents the owner's full name—Way. The upper brand is in one piece with two tangs which are brought into one a few inches up. In making it I made a stump in the center of the

two H's, cutting it up as a cross. I then stumped onto what is the W, and also formed another side of the H. Next, I stumped on the other side of the second H, which completed that part. I then welded the other tang on the W. Bending the W then finished the job, except the dressing up and welding on handle. After finishing, one



MR. WATT TELLS ABOUT MAKING
BRANDING IRONS

man asked me how I managed to make such a brand all in one piece. It is all very simple, but takes a little time. For the lower brand, I stumped onto the Y, and put in the centerpiece to form the A. In making a brand I always draw it full size and take measurements. This is a 3- $\frac{1}{4}$ -inch brand.

WM. W. WATT, South Africa.

A Maine Shop.—Painting Metal Auto-Bodies.—My shop is located in Maine. I have power installed and the following equipment: a 12-inch rip saw, a 26-inch band saw, a 10-inch planer, a lathe for wood or iron with 6-foot bed, an upright mortiser, a boring machine, a drill press, a matching machine and a grindstone. These I operate with a 6-horsepower Reliance "Woodpecker."

The shop is 40 by 60 feet, with paint shop on upper floor. I do everything but shoeing horses, and have never seen the time since I started in business ten years ago but that I have had all the work I could do, and at times was obliged to hire two extra men. Prices are very low in this part of the country. I do auto-painting and repairing. I have a Studebaker 30, 5-passenger model, and like it very much, but don't get much time to ride in it.

I would like to inquire of the craft the best method of painting metal auto-bodies so that the paint won't peel. I am now scraping the paint from a Ford car. If there is any better way of removing the paint than by the use of a good steel scraper I would be glad to hear of it. I have tried paint removers and my blow torch, but can make better headway with the thin steel scraper.

C. H. CARTER, Maine.

In Reply.—There have been a good many complaints, during the past year, concerning the flaking of color. At the rate which the average automobile is turned out, this trouble should not be altogether unexpected. A good deal of the alleged flaking of color consists of the undercoats flaking and carrying with them portions of the finish. In repainting these jobs, it is not expedient to remove the old paint structure entirely, and the best thing to do is to scrape and clean away these peeled and fractured places; touching them up with a strong elastic

paint. Then, in due time, plaster them with putty to the level of the surrounding surface, rub them down with raw linseed oil and artificial block pumicestone, and then fetch them along in the usual way with the remaining part of the surface.

The painting of sheet steel, such as is used in auto-bodies, requires the use of elastic and tenacious coatings, to an extent heretofore not noted. To furnish such coatings, perfectly pure, well aged, high-grade raw linseed oil is needed. Linseed oil acquires a substance and sinew and a wearing value by age. This is the main factor in producing a good, even, durable coat on autos. The auto-body receives anywhere from twenty to thirty coats on its initial painting at the factory, and we could not detail here the complete process.

In removing old paint from the body, it is better to burn it away, as the scraper is liable to bruise the structure and cause dents, nicks, etc., although it is much quicker, as you suggest—it may be used with care.

A. E., New York.

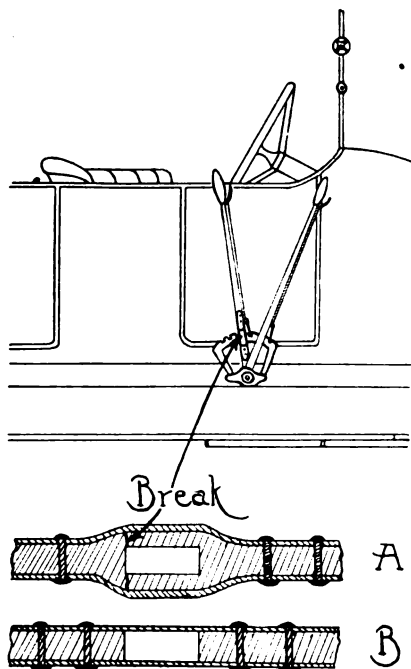


The Automobile Repairman

To Repair Broken Controlling Lever

L. R. SWARTZ

One of the two controlling levers working on the quadrant outside of tonneau at the right of the driver's seat was broken. The chauffeur had wedged the broken lever to position on the quadrant, using a screw driver as a wedge, and had run in from a half mile down the pike to the shop. This occurred on a Sunday evening and like all autoists, he was in a great hurry to proceed on his journey. While the broken lever was being removed, I took a piece of $\frac{7}{8}$ by $\frac{1}{4}$ -inch steel tire and improvised a swage to give it the proper set for plating the lever. By this means we had the repair almost half finished by the time we got the broken parts to the anvil. After fitting and drilling the plates, we drilled the holes in lever to meet the holes in ends of plates with about $\frac{1}{32}$ -inch draw to bring the broken



HOW A BROKEN CONTROL LEVER
WAS REPAIRED



ends firmly together; we then warmed the plates, and having pointed the end rivets to act as drifts, drove them home. We then drilled the holes next the eye and put in the two middle rivets, which finished the job, as shown at A. We used $\frac{5}{16}$ Norway-iron rivets on this job. When finished, the lever was firm and seemed to be as strong as ever.

In a job of plating, where two side plates are used, it is best whenever possible to drill for a draw and heat the plates so as to keep the break fast by means of the contraction of the plates. For such repairs as this, iron is not firm enough to stand the

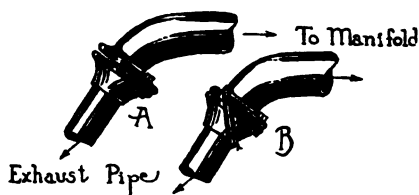


FIG. 1—HOLDING UP THE EXHAUST CONNECTION

strain, on account of having to be drawn out thin in order to let the levers pass each other when in use. In fact, steel is the most satisfactory stock to use for most auto-repair work.

Where room is lacking, saw off broken parts flush with main part of lever and plate and drill so as to make eye for quadrant of same dimensions as before being broken, and plate with plain, straight plates, as shown at B.

To Avoid Damage to Plugs by Oxygen Process

A prominent maker of spark plugs sounds a warning to repairmen and others making use of the oxygen process of carbon removal. In cylinders fitted with single plugs, the plug is, of course, removed to insert the oxygen tube, but in cylinders fitted with two plugs, both plugs are not always removed, and thus damage results to the plug remaining in the cylinder.

"The spark plugs are the principal sufferers from the oxygen treatment," says this spark-plug maker. "When this method of carbon removal is used in engines having two plugs to each cylinder, the oxygen tube is passed through one plug orifice, and the remaining plug (not being removed) is consequently subjected, during

the burning of the carbon, to terrific and constant heat, such as was not taken into consideration by the maker of the plug. In consequence, various detrimental results are liable to follow; the porcelain or other insulating material may be damaged and the plug thus made worthless, or the points or electrodes may become warped, burned and otherwise distorted from their proper relation to one another."

There is nothing in the foregoing to condemn the oxygen process for carbon removal (for that specific purpose it seems very satisfactory), but a generally satisfactory result can be assured only if the spark plugs regularly used are removed and replaced with blanks or a set of discarded plugs during the time that the intense heat is present in the cylinder.

Three Auto Kinks

L. R. SWARTZ

Exhaust Manifold Connection

On some cars the connection between exhaust manifold and exhaust pipe is secured by cap screws, and one or the other may be broken off; leaving the weight of pipe and strain of holding the joint on one cap screw, as shown at A in Fig. 1. To prevent damage from exhaust pipe falling in case of the other screw breaking, take a couple of turns around the joint with good wire and draw tight, as at B. The proper way to fix this break is to take out the cap screws or parts and ream the holes in the flange on end of exhaust pipe, and secure by machine bolts of the proper size. It often happens, however, that one has not the time to do this, so that wiring is the only way of making a support quickly.

An Ignition Hint

Sometimes a car will act very well until it comes down a long grade and then it refuses to ignite. The batteries and battery connections seem good up to the coil-box, and still no spark is to be had at the spark plugs. If the car has been out for some length of time, and the battery current is wired through the magneto, go after the platinum contact points at commutator end of magneto, and you will generally find a poor contact, which calls for dressing the contacts so as to form a good connection. This can be done with a fine file unless the con-

tacts are worn out, when new platinum points are required. Before doing anything with magneto, be sure that all battery wires and connections are good, that the engine is getting the proper amount of gasoline through the carburetor and that there is no water in carburetor. This trouble can be detected by trying for spark just back of magneto.

Replacing Bolt In Steering Knuckle

The bolt that holds the steering connection to the axle was broken on left side of machine and the thread damaged in the lower section through which the bolt passed (see Fig. 2). The lower end of the bolt was secured by a jam nut. The upper or head end of the bolt was tapered to fit a taper in the bolt hole of the upper section. The main part of the bolt being only $\frac{3}{8}$ inch in diameter, it required good stock in making a new bolt that would stand the strain. I took a piece of $\frac{3}{8}$ -inch steel pump rod, upset one end and forged the taper to correspond with the taper in the hole. I cut it to proper length and threaded lower end for about $1\frac{1}{4}$ inch. I then took a long tap and renewed the thread in lower section of the knuckle, put in the bolt and secured it with a jam nut. This steel pump rod has about

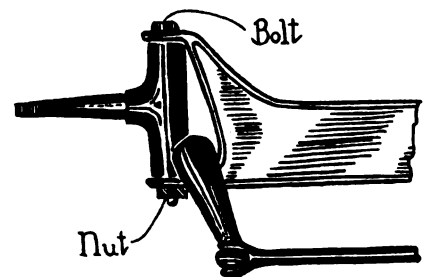


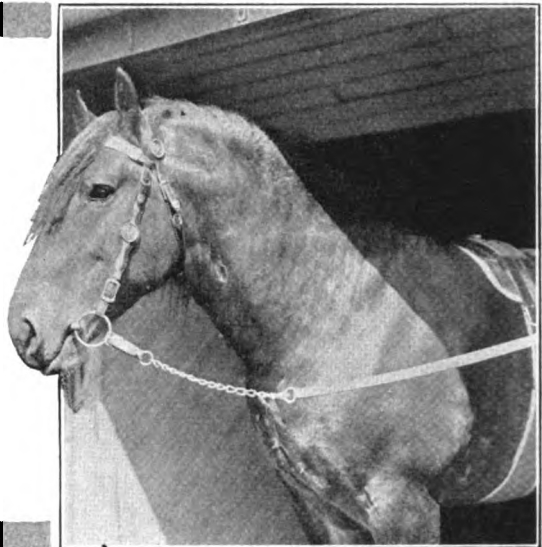
FIG. 2—REPAIRING A STEERING KNUCKLE BREAK

four times the tensile strength of iron of the same diameter. It is good material for bolts and clips where small size and strength are required, and it is a good plan to have a little of it on hand.

I have a line of taps with stems 10 inches to 12 inches long and find them very convenient in many places on repair work. They run from $\frac{1}{4}$ inch to $\frac{7}{8}$ inch in sixteenths. I also have a lot of relief reamers fluted for about 6 inches, and some mullers. These reamers and mullers range from $\frac{1}{2}$ inch to $1\frac{3}{8}$ inch in diameter. With this assortment there are not many occasions when I have difficulty in making things fit right.



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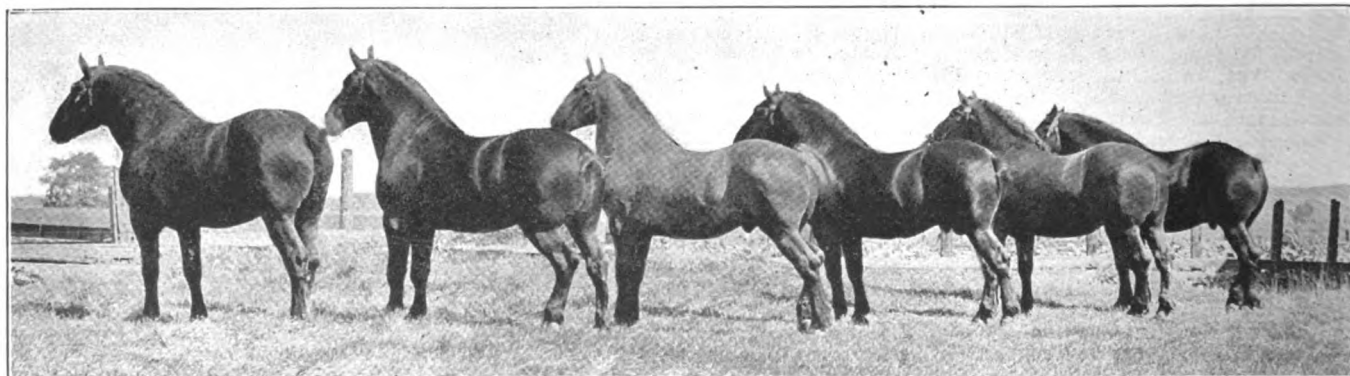


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In all my life I have never seen as good a blower as yours. It has given perfect satisfaction.

(Signed) A. LOCKART,
5333 Lake Ave., Chicago, Ill.

We are entirely satisfied with your blower and expect to use two more before long.

(Signed) SHELBYVILLE GARAGE & REPAIR CO.,
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I installed your blower last Saturday and find it not necessary to take your ten day trial offer as I am fully satisfied that it will do the work intended. Indeed, to be frank with you, I can truthfully say that it does better work than The _____ Blower for which I paid \$50.00.

With a new fire I have taken a white heat in the middle of a bar of 1½ inch by 4 inch iron in six minutes. I consider this as good as I could have done with my belt connected fan which is 20 inches in diameter and run by a 2 H. P. motor.

(Signed) THOMAS D. BRUX, Shipsmith,
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(Signed) W. G. WRIGHT, Pomeroy, Ohio.

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(Signed) F. C. BERRY & Co., Urbana, Ohio.

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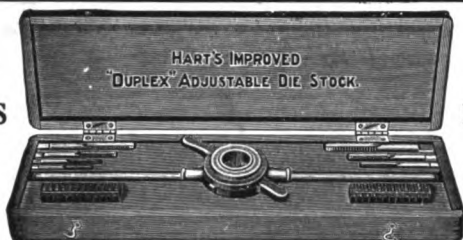
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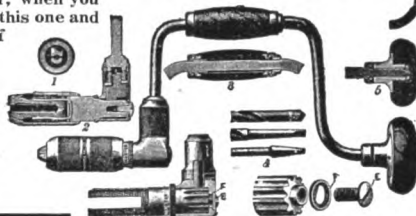
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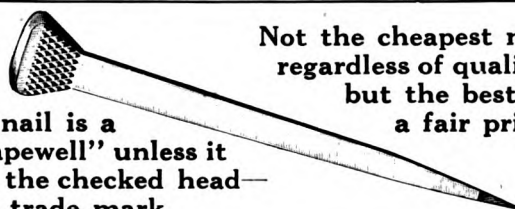
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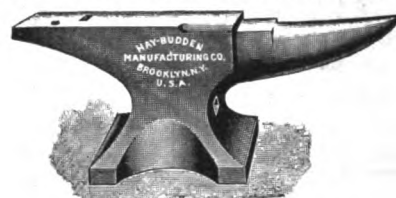
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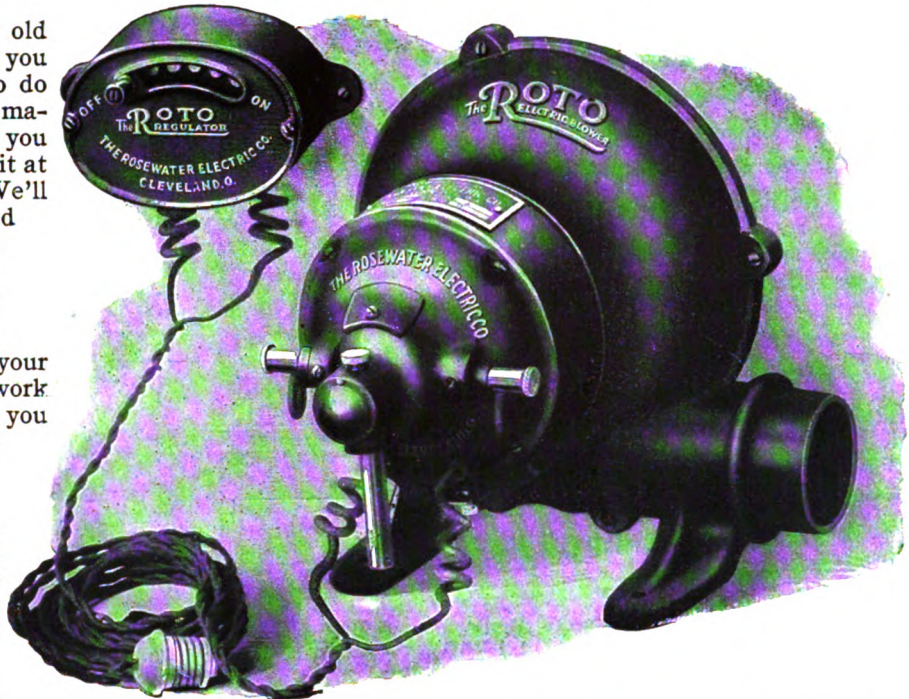
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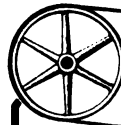
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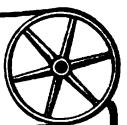
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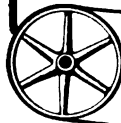


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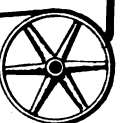
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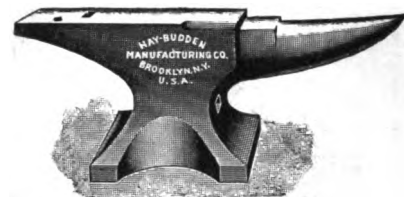
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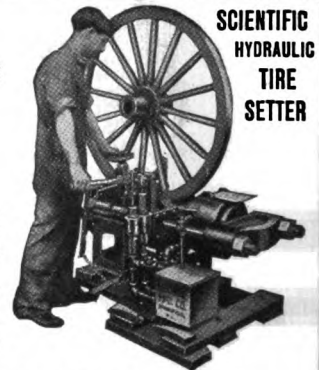
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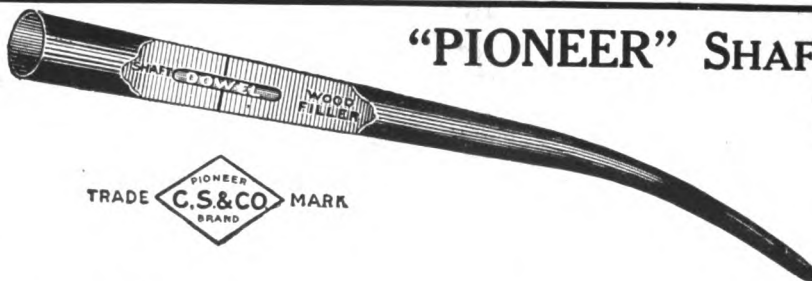
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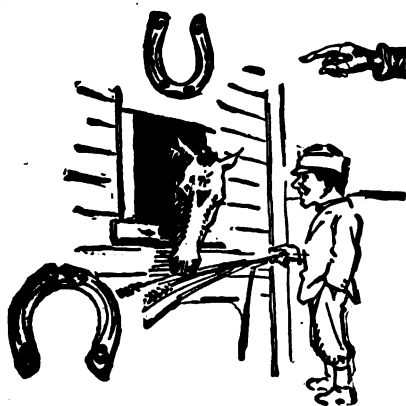
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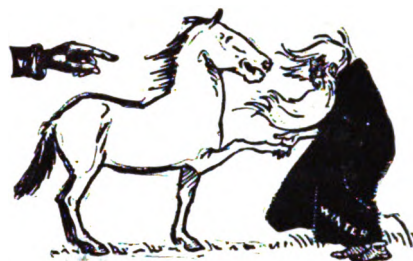
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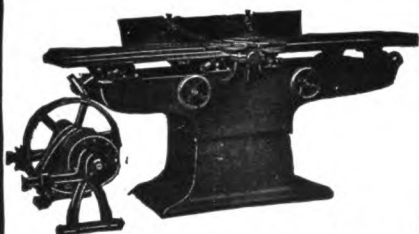
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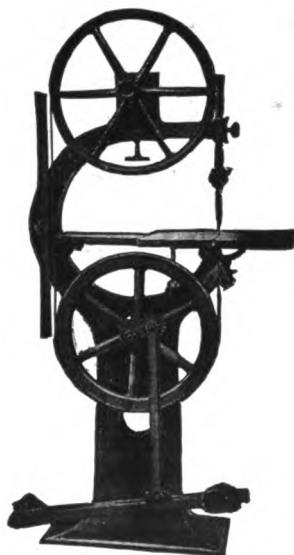
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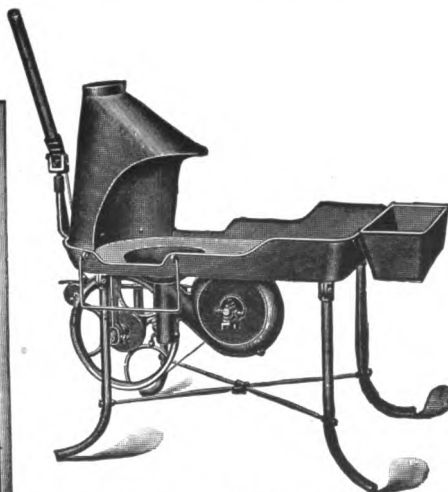
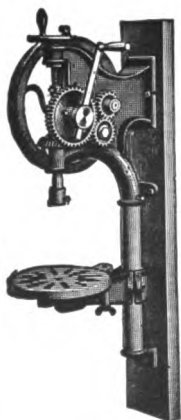
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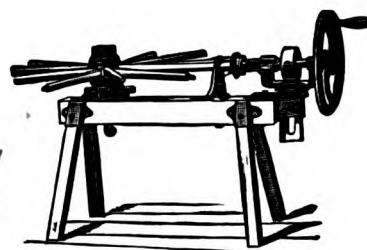
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Our Portable Forge Booklet illustrates some 14
kinds. We have a size to suit your needs.
Strong and durable. Attractive designs.



SPOKE TENON MACHINES
in Seven Sizes. Fitted with
Star Hollow Auger.

THE SILVER MFG. CO.
365 BROADWAY SALEM,
OHIO.

Quality for Every Penny Invested

For genuine ease and convenience of operation, high-class of work and variety of work, the Silver tools are in a class by themselves.

They are intended for the smith who insists upon quality for every penny invested and they are guaranteed to give absolute satisfaction.

A trial will make you realize what renders the price and performance of Silver tools extraordinary.

SEND TODAY FOR MACHINERY CATALOG

or for any of the following booklets:

PORTABLE FORGES—Illustrating and describing 14 styles.

POWER DRILLS—Illustrating our line of 20" machines with lever feed, lever and wheel feed, power feed with automatic stop, power feed with back gears and automatic stop.

DRILLING MACHINES—Covering our new line of ball bearing post drills.

HUB BORING AND SPOKE TENONING MACHINES—Illustrating and describing several sizes of each.

BAND SAWS, JOINTERS AND SAW TABLES—Special loose leaves, illustrating and describing 20" Band Saws for foot or belt power or combination; 26, 32 and 36" power Band Saws with new features; also Saw Tables and five sizes of Jointers.

W
JAN 26 1914
VOLUME 13

THE

NUMBER 4

AMERICAN BLACKSMITH

A Practical Journal of Blacksmithing and Wagonmaking

BUFFALO
N.Y. U.S.A.

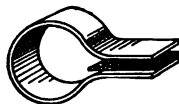
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WELDING PLATES

After thirty-five years (1879) "LAFFITTE," the original Welding Plate, defies comparison by any imitation, due to the scientific chemical composition—producing absolutely perfect welds not possible to secure with any imitation or compound. Send for complete information; be your own judge and try a Free Sample. Mailed on request.



LAFFITTE BRAZING PLATES

All ingredients in one piece. Very fusible. Perfect results.
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No. 2, for copper and iron.
No. 3, for iron and steel.

SAMPLES FREE

LAFFITTE WELDING POWDER

Use where plate is not adaptable.
Welding in a hole, filling iron and steel castings. Also general welding.

SAMPLES FREE

LAFFITTE TEMPERING POWDER

Tempers tools at low heat.
Makes mild steel as hard as high carbon and cast steel.
For cementation also.

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LAFFITTE BRAZING POWDER

Replaced borax—goes four times as far.
No swelling or blistering; flows rapidly.

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"Unifonte" The Cast-Iron Brazing Paste. The only compound that will perfectly braze Cast Iron—broken or cracked. Any mechanic can use it with absolute success. Does not deform the casting; no danger of burning as it works at a low heat. Braze three times stronger than original casting. Sample outfit at \$3.00 postpaid sufficient for 25 to 50 perfect brazes of cast iron.

Phillips Aluminum Solder: A perfect solder. Works at a low heat. A joint or built-up piece made with this solder will last as long as the original article.
1/4 lb. Sample postpaid, \$1.00.

THE PHILLIPS-LAFFITTE CO. SOLD BY ALL ACTIVE DEALERS
801-804 PENNSYLVANIA BUILDING Philadelphia, Pa., U. S. A.

**THE SILVER MFG. CO.**

365 BROADWAY

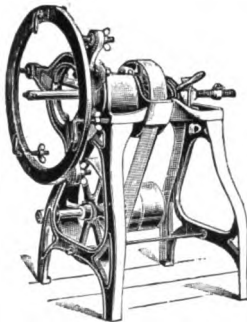
**SALEM,
OHIO.**

Fig. 708

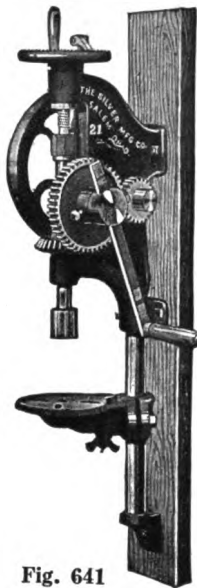
Hub Boring Machine

Fig. 641

No. 21 Hand Post Drill

Fig. 642

No. 22 For Hand Power**Graceful
Serviceable Tools
At Moderate Prices**

Do not let your favorable impression end with your admiration for the graceful designs and neat lines of Silver's Tools. They possess in a high degree the ability to turn out high-grade work at minimum cost—to make money month after month for you. Wherever good honest construction at a low price appeals, Silver's tools are favorites. Adapted for auto garage work and repairing. Insist on the "Silver" kind—don't take any other—then you'll have no cause for regret.

SEND TODAY FOR MACHINERY CATALOG*or for any of the following booklets:***PORTABLE FORGES**—Illustrating and describing 14 styles.**POWER DRILLS**—Illustrating our line of 20" machines with lever feed, lever and wheel feed, power feed with automatic stop, power feed with back gears and automatic stop.**DRILLING MACHINES**—Covering our new line of ball bearing post drills.**HUB BORING AND SPOKE TENONING MACHINES**—Illustrating and describing several sizes of each.**BAND SAWS, JOINTERS AND SAW TABLES**—Special loose leaves, illustrating and describing 20" Band Saws for foot or belt power or combination; 26, 32 and 36" power Band Saws with new features; also Saw Tables and five sizes of Jointers.

Made with Ball Bearings and Intermediate Gear. Fast or Slow Speed. Hand or Belt Power. Perfect Drills for work of all kinds.



Fig. 644. No. 22.

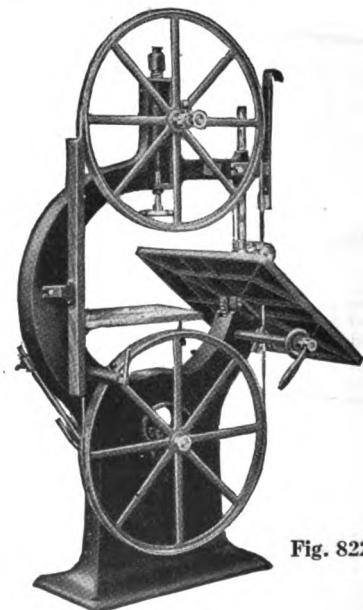


Fig. 822

Band Saw—Four Sizes

AMERICAN BLACKSMITH

A Practical Journal of Blacksmithing and Wagonmaking

BUFFALO
N.Y. U.S.A.

FEBRUARY, 1914

\$1.00 A YEAR
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COLUMBIAN

More Columbian Blacksmith Vises are made and sold than all other makes combined.

WHY?

Because each jaw is *forged*, from top to bottom, of *one* piece of high grade *forging* steel.

The back leg is *drawn*, *not* welded, overcoming the breakage and weakness found in other vises.

Jaws are faced with high grade tool steel.

The screw, which is one solid *forging*, and the malleable iron box are $1\frac{1}{2}$ inches longer than are found in any other blacksmith vise.



We are now manufacturing our vises with a *forged* ring and washer, which assure perfect alignment of the jaws; and the *forged* bench plate is designed to give the maximum

strength and stability to the vise when in position.

With our modern machinery equipment, recently installed, we are able to make and sell a *better vise* at the *same price* at which others sell vises of inferior quality.

We carry a large stock of every size vise shown in our catalogue and can ship any order on the day we receive it.

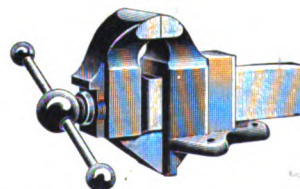
When you buy our vise you receive
QUALITY, SERVICE, PRICE

Every Face Guaranteed Hard by
Scleroscope Test.



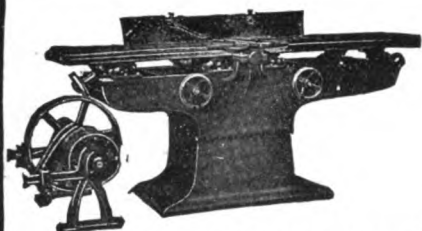
Columbian all Steel Weldless
Anvil.

Columbian Indestructible
Malleable Vise.
Patent Applied For

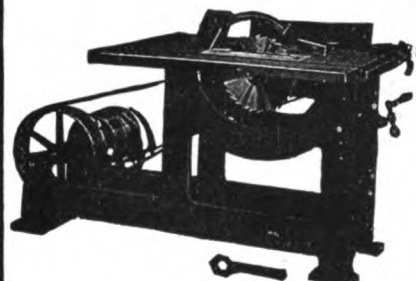


MALLEABLE IRON throughout except tool steel jaws and forged handle and screw.

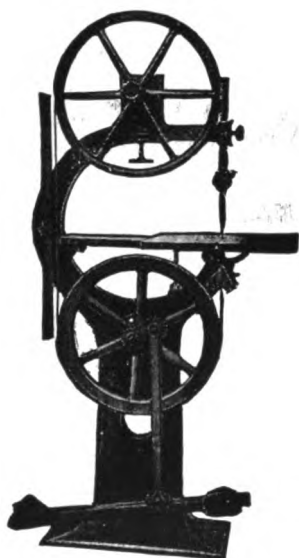
THE COLUMBIAN HARDWARE CO. CLEVELAND, O.
WRITE FOR CATALOGUE AND SOUVENIR.

**SILVER'S NEW JOINTERS**

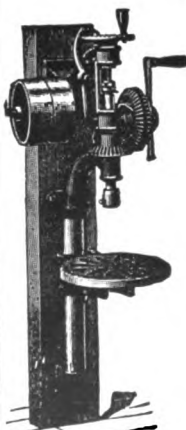
Five Sizes—8, 12, 16, 20 and 24 inch.
New "patent applied for" features.

**SILVER'S SAW TABLES**

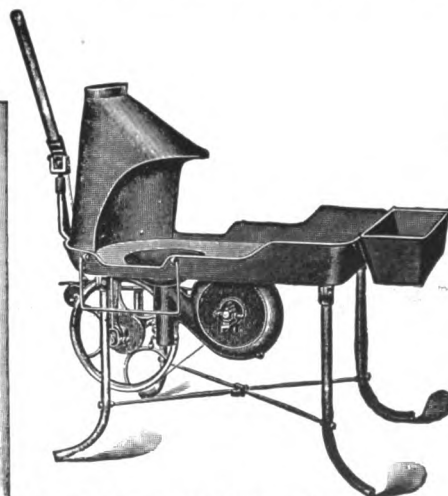
Send for circular of Saw Tables and
Swing Saws.



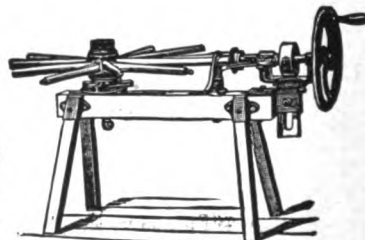
NEW PLANETARY BAND SAW
20-inch Foot or Combination.



Our Booklet, "Drilling Machines," illustrates
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Strong and durable. Attractive designs.



SPOKE TENON MACHINES
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AMERICAN BLACKSMITH

A Practical Journal of Blacksmithing and Wagonmaking

BUFFALO
N.Y. U.S.A.

AUGUST, 1914

\$1.00 A YEAR
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Screw Calk Prices Smashed

**Famous "Golden" Rustless Ring-Points
Cut \$4.00 to \$8.00 a Thousand
to Horseshoers for 1914 - 1915**

But Not Sold to Retail Stores at Any Price in Spite of the U. S. Government Suit Against Us.

"Golden" Rustless Ring-Points are the only scientific, modern, up-to-date screw calks made, because:—

1. They have wedge-shaped centers of tool steel running clear through the calks and expanding in proportion as the outside part of the wearing end grows larger.
2. They have a bright "golden" plate which prevents the threads from rusting into the shoes and advertises the calks automatically to all the horseowners in town.
3. The threads are notched so that Ring-Points "hang" in the shoes better than all other screw calks.
4. They are made easy to start without the loss of a whole thread which would make the calks more liable to loosen and fall out.
5. The steel used in these calks costs about twice as much as that used in competing calks.
6. By scientific methods of heat treatment worked out by us we produce calks that are harder and more uniform than any others.
7. As a result of special steel, furnished to our own specifications, special tests gotten up by us and the most careful scientific manufacturing methods at the hands of skilled and well-paid workers

RING-POINTS WEAR LONGER AND SHARPER

than other calks and satisfy the horseowners as no other goods will.

*The wise horseshoers are writing today for
split and whole samples to show
their customers.*

**Our 1914 Price List on Screw and Drive Calks
is now out. Have you got yours?**

The Rowe Calk Company
Hartford, Conn.



Interior View of Modern
Long-Wear "Golden"
Rustless Ring-
Point.



NEW Ring-Point H Drive
Calk for Pavements.
The World's Best.
Send for Sample.



THE SILVER MFG. CO.

365 BROADWAY SALEM, OHIO.

A New Line of STEEL FORGES

Equipped with

Silver's Mechanical Blower

Every Blacksmith should have a copy of our latest booklet on Mechanical Blowers and Steel Forges.

It fully illustrates and describes a brand new up-to-the-minute line of tools that you should know about. They will save money from the start and will keep up the good work indefinitely.

Ask for Catalog 109

It will come by return mail



Fig. 941



Fig. 953

SEND FOR MACHINERY CATALOG No. 60

or for any of the following booklets.

SILVER'S MECHANICAL BLOWERS AND STEEL FORGES.

PORTABLE FORGES—Illustrating and describing 14 styles.

POWER DRILLS—Illustrating our line of 20" machines with lever feed, lever and wheel feed, power feed with automatic stop, power feed with back gears and automatic stop.

DRILLING MACHINES—Covering our new line of ball bearing post drills.

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Fig. 940LT

**Silver's
Mechanical
Blower
Mounted on
Pipe Legs, or
with Pedestal
and Round
Base**

1914

AMERICAN BLACKSMITH

A Practical Journal of Blacksmithing and Wagonmaking

BUFFALO
N.Y. U.S.A.

SEPTEMBER, 1914

\$1.00 A YEAR
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Modern Scientific Efficiency

**Famous, Long-Wearing, "Golden"
Rustless Ring-Points Now Cut in Price
to the Level of Old-Fashioned Calks.**

Sold to Blacksmith Supply Houses Only in Spite of the U. S. Government Suit Against Us.

**"Golden" Rustless Ring-Points are the only scientific,
modern, up-to-date screw calks made, because:—**

1. They have wedge-shaped centers of tool steel running clear through the calks and expanding in proportion as the outside part of the wearing end grows larger.
2. They have a bright "golden" plate which prevents the threads from rusting into the shoes and advertises the calks automatically to all the horseowners in town.
3. The threads are notched so that Ring-Points "hang" in the shoes better than all other screw calks.
4. They are made easy to start without the loss of a whole thread which would make the calks more liable to loosen and fall out.
5. The steel used in these calks costs about twice as much as that used in competing calks.
6. By scientific methods of heat treatment worked out by us we produce calks that are harder and more uniform than any others.
7. As a result of special steel, furnished to our own specifications, special tests gotten up by us and the most careful scientific manufacturing methods at the hands of skilled and well-paid workers

RING-POINTS WEAR LONGER AND SHARPER

than other calks and satisfy the horseowners as no other goods will.

*The wise horseshoers are writing today for
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**Our 1914 Price List on Screw and Drive Calks
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Interior View of Modern
Long-Wear "Golden"
Rustless Ring-
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NEW Ring-Point H Drive
Calk for Pavements.
The World's Best.
Send for Sample.



THE SILVER MFG. CO.
365 BROADWAY SALEM, OHIO.

Send For Your Copy Today!

Just write a postal card "Send me your Machinery Catalog No. 60." It will come by return mail.

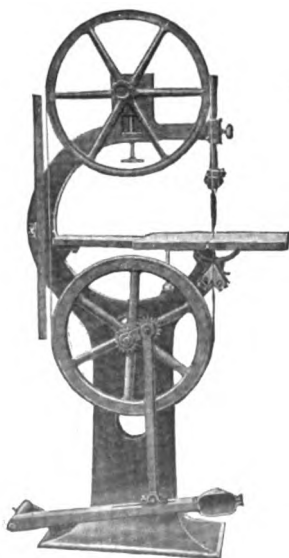
This beautifully printed catalog illustrates and describes our complete lines of Carriagemakers' and Blacksmiths' tools, including Hub Boring and Spoke Tenoning machines, Band Saws in four sizes, Jointers or Buzz Planers in five sizes, Saw Tables and Swing Saws, Ball-Bearing, Hand or Power Post Drills, 20-inch Power Swing Drills, and Portable Forges in a variety of styles.

There are some surprisingly good opportunities in this catalog for better, quicker and cheaper work in your shop. It's a wise move to get a copy and see for yourself.

Silver's Mechanical Blowers and Steel Forges

An entirely new line—since No. 60 Catalog was issued—of Portable Steel Forges in a variety of styles, all equipped with our noiseless oil-bath Mechanical Blowers.

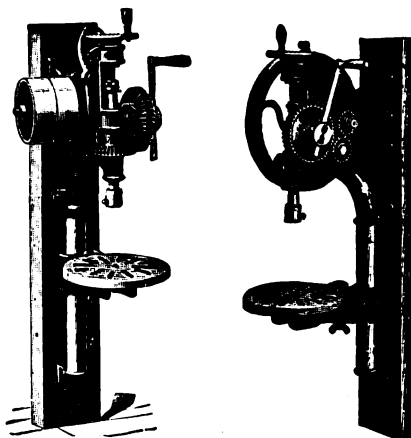
Ask us for Catalog No. 109.—Giving full information and description of these new Steel Forges and Blowers.



NEW PLANETARY BAND SAW
20-inch Foot or Combination.



Our Portable Forge Booklet illustrates some 14 kinds. We have a size to suit your needs. Strong and durable. Attractive designs.



Our booklet, "Drilling Machines," illustrates several kinds we make.



a Message for You

Here's information you ought to have and help you will find worth while. Smiths by the hundreds say this book is as useful as any Smithing work they have ever received—you can tell why if you read this page.



Your Reputation and Your Smithing Coal

YOU know that without good, reliable smithing coal all your skill, your labor, your time, your metal, your reputation for workmanship—all are in vain. Good smithing can't be done with poor coal.

You know it, but the public doesn't. The man for whom you work doesn't know it. In his eyes it's simply "poor smithing"—not poor coal. He doesn't waste time investigating where the fault lies.

That is why **YOU** are justified in investigating carefully the coal you use. You can't be too particular about it. You don't want coal that requires constant cleaning, watching or nursing. You want to be able to devote your attention to your metal and your tools. You want to have your mind left free for that.

Therefore you want to be sure that the smithing coal you use is high in heat value, practically free from impurities and elements injurious to your metal. Sulphur, for example, is your arch enemy. Its effect on iron is especially disastrous at welding temperatures. So the less of it the coal contains, the better.

The percentage of ash should also be low. Otherwise it will clog the fire, "make it dirty" and cause irregular heats with decreased efficiency of the fuel.

1

Don't you want to read the rest? There are 16 more pages of good, sound, first-hand, near-the-forge knowledge and help in this **FREE** book. Write for a copy—putting your name on the coupon is enough.

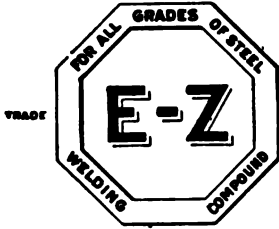
Pennsylvania Coal & Coke Corporation
Whitehall Building, New York

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Gentlemen:—Send me a free copy of your new booklet, "Forge Fire Facts."
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Address.....
State.....
Sept., A. B.

**"E-Z" Welding Compound**

is the best BECAUSE it works equally good on all kinds of steel. It welds at lower heat than any other. It sticks to metal at a very low heat. It leaves no

scale. Use it once and you will always want it.

Crescent Welding Compound

makes smoother welds than any other. It is fine for plowwork or where parts are fastened together before welding, or for mak-

ing split welds, finishing heats, or for welding under dies, etc., etc. It insures smooth finish and perfect welds on Toe Calks.

"Money back" from any jobber if "E-Z" or Crescent does not give perfect results.

We will send Samples free

Made only by

Anti-Borax Compound Co.

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Save Money

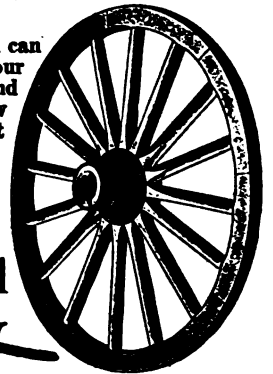
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Buy Wheels Direct From the Makers

Our wheels are sent direct from the shipping room to your door. You pay one profit only and that a very small one. Sarven Patent Wheels are made in all grades with round edge steel tires. They are also made without tires, or Sarven Patented Spokes and Hickory Rims also may be obtained separately.

Our price list shows you how you can make big savings by buying your wheels and supplies from us. Send your name and address now and we will send the price list by return mail.

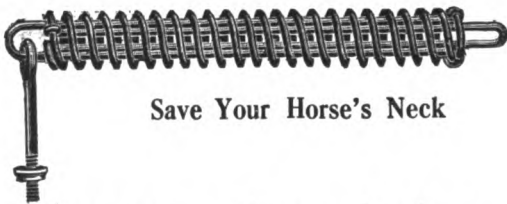
Drop us a card today.



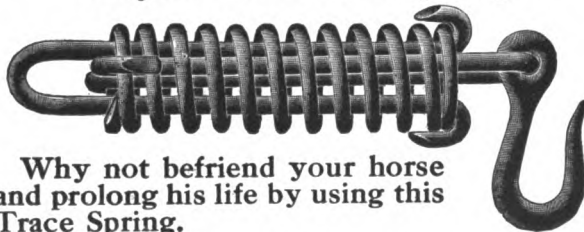
Carriage Wheel Supply Company

Union City

Ind.

RAYMOND POLE SPRINGS

Save Your Horse's Neck

Keystone Trace Spring

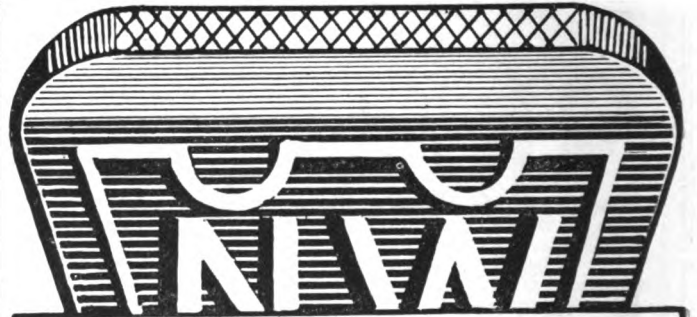
Why not befriend your horse and prolong his life by using this Trace Spring.

Keystone Brake Springs

Write your Jobber for Circular and Prices

RAYMOND MANUFACTURING CO.

CORRY - LIMITED - PA.

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For Strength, Safety And Quality Of Material

The most perfect in form and finish. Made of the best Swedish Iron. Will hold a shoe longer than any other nail made. Has a re-enforced point—making it easiest to drive and the safest to use.

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**Most Horse-Shoers
Know That——
Phoenix
Horse and Mule
Shoes and Bull-
Dog Toe Calks are
The Best**



No. 100 Royal Forge



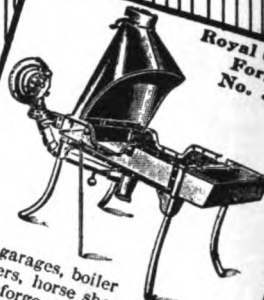
The most popular forge of to-day.

Western Chief Forge, Size XBB



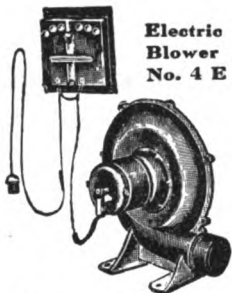
For power shops, or where a forge for heavy work is desired.

Royal (Steel) Forge No. 37



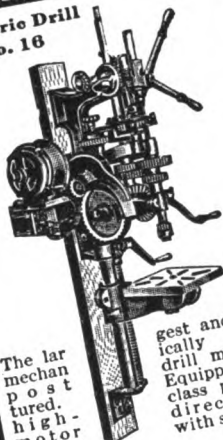
For garages, boiler makers, horse shoers or any first-class forge shop.

Electric Blower No. 4 E



One fire variable speed blower.

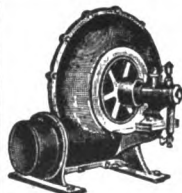
Electric Drill No. 16



The largest mechanical post-tured, high-motor needed drive.

greatest and most ically perfect drill manufac- Equipped with class powerful directly con- with spur gear

Power Blower



Made in 5 sizes. Adapted to forge fires and light Cupola work. Built for service.

No. 1½ Western Chief Tire and Axle Shrinker



The easiest operated shrinker in the world.

When the Name

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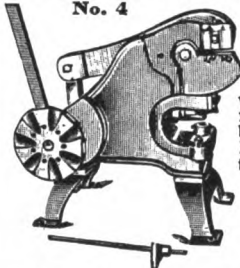
is found on a Forge Blower, Drill or any other Blacksmith Tool that is all the guarantee necessary

We Warrant All Articles of Our Manufacture

SOLD BY JOBBERS AND SUPPLY DEALERS EVERYWHERE

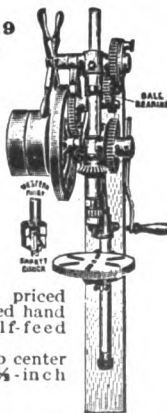
CANEDY-OTTO MFG. CO.
CHICAGO HEIGHTS, ILL. U.S.A.

Combination Punch and Shear No. 4



It can be operated toward the front or back. Depth of throat 6 inches.

No. 19 Drill



A low priced combined hand and self-feed drill. Drills to center of 1½-inch circle.

Royal H. Blower

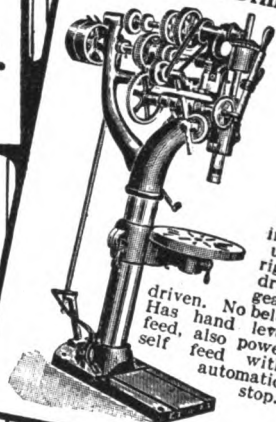
Fire Pot 8x9½x4 in. inside.

The successful blower.



Spur gears used only. Ask the man who owns one.

No. 31 Drill



20-inch up-right drill gear driven. No belts. Has hand lever feed, also power feed with automatic stop.

COUPON

CANEDY-OTTO MFG. CO.,
Chicago Heights, Ill.

Gentlemen:

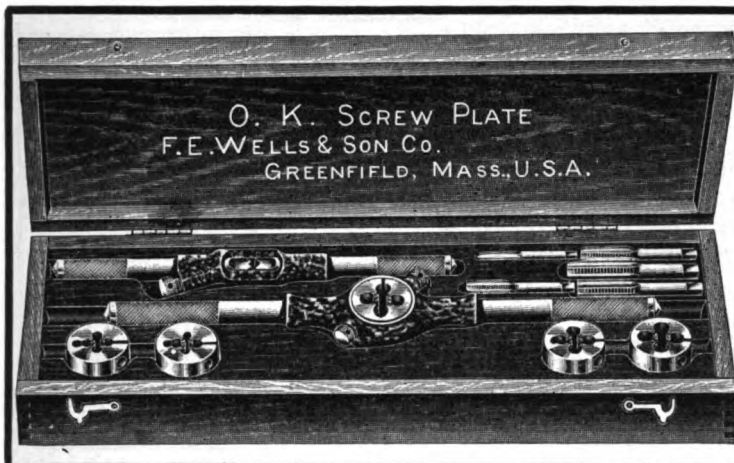
Please send me a free copy of your 160-page Tool Catalogue.

Name _____

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State _____

Give name of your jobber or supply dealer here _____



The New **O. K. Screw Plates** are the **Real Thing** when it comes to **Quality and Quantity** of work.

O. K. Dies are the **ONLY** Dies drop forged from **Flat Bar Steel**, which is better than Round Steel. The Forging Process *toughens* and *refines* the steel making more *durable* dies.

Please send to us for Free Catalog on O. K. Screw Plates, Dies, Tap Wrenches, Etc.

F. E. WELLS & SON CO. Greenfield, Mass. U. S. A.

A \$100.⁰⁰ Power Hammer

For \$60.⁰⁰

For Blacksmiths and Manufacturers

Write for full particulars

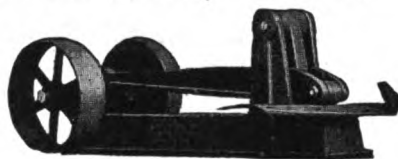
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Why, it's the **Justrite Plow Blade and Disc Sharpener**, that every blacksmith ought to have. Does more and better work than power trip hammers, leaving the plow-*lay* rolled to a sharp, smooth edge and free from nicks. It's the best yet. Ask your jobber, or write us direct.

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Address,

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SOLID WROUGHT ANVILS

stand firmly on the block.

Forged from solid new steel—not cast.

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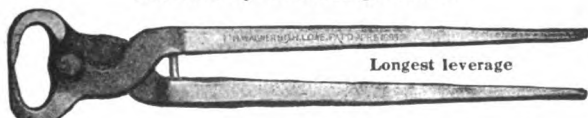
THE COLUMBUS FORGE & IRON CO. COLUMBUS, OHIO.

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Horseshoers who have used them use no others.

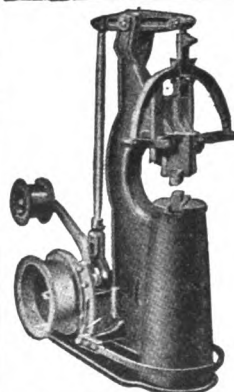
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The Lowe Manufacturing Co., Enderlin, N. Dak.

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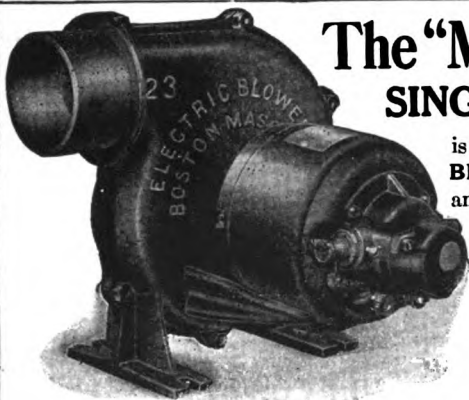
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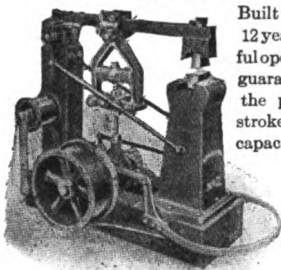
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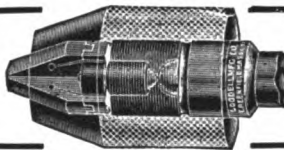


Built in three sizes. 12 years in successful operation. Fully guaranteed. Note the principle of stroke. Double the capacity of any up-right hammer of the same weight and price. For price and descriptive literature, write,

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Strong, accurate, well made, and sell at a popular price. Try them without delay.



Especially suitable for the blacksmith. We will send you descriptive circulars upon request.

Ask your Jobber or write us direct.

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Don't buy a Jointer Head until you have our circular and prices. Made in five different styles, with 8, 12 and 16 inch knives. You can dress more lumber in one hour with one of our Jointer Heads than you could in four days with your hand plane. Also get prices on our Power Grindstone Shaft and Nut Splitters. If your Jobber can't supply you we can. Manufactured by

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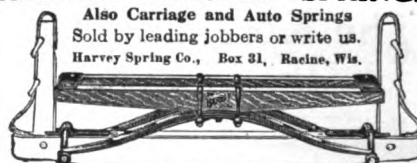
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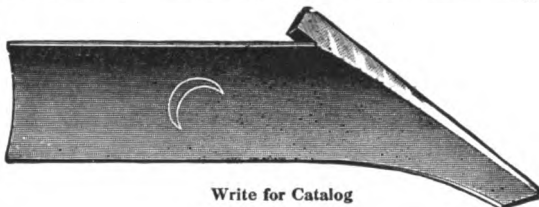


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Try Borax-ette for Welding Toe-Calks THEY WON'T KNOCK OFF

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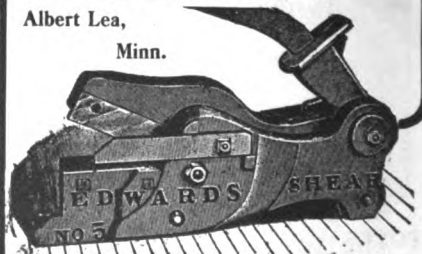
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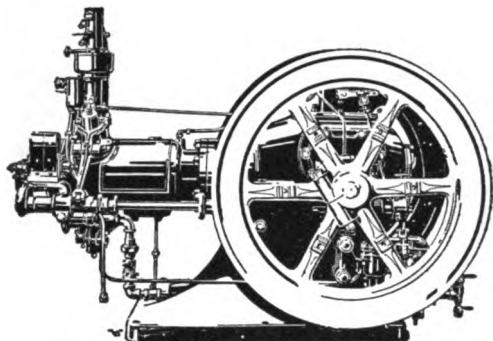
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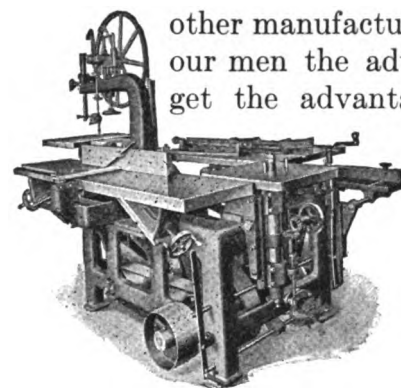
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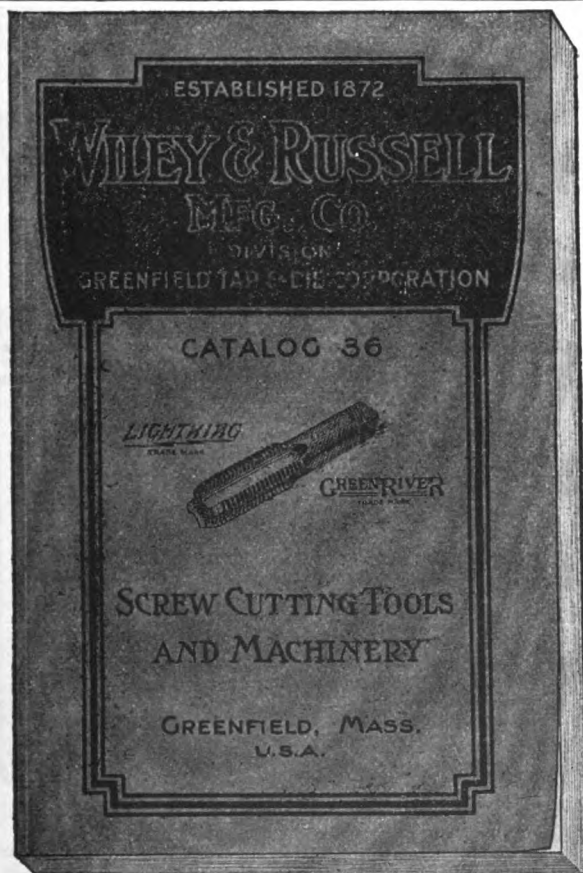
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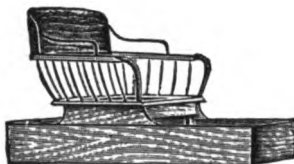
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Untrimmed \$2.30 and up
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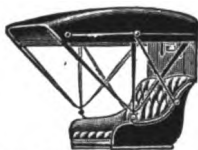
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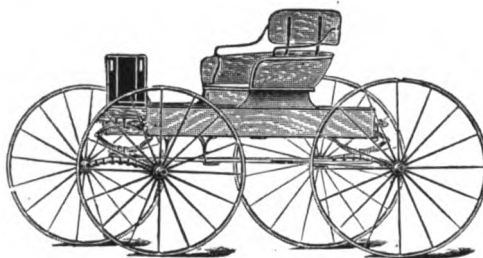
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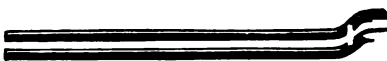
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Seat \$.95 and up
Cushion 1.55 and up
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Top 5.65 and up

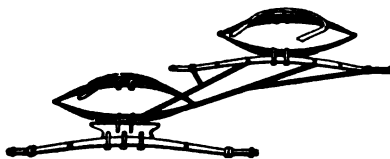
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We're Anxious for the Test

Right in your own shop, at your own work we're anxious to show you how to save money on tool steel.

Tools and dies made of Scott's tool steel do cleaner work and more of it with less time lost in regrinding and remachining. They are easy to harden, too.

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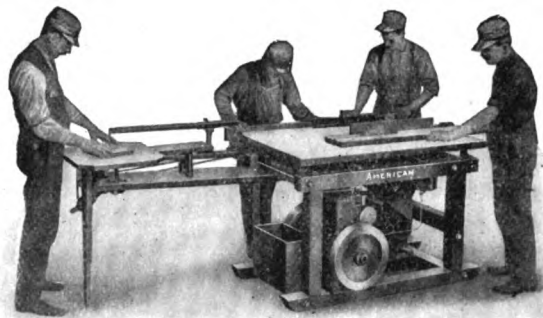
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For Blacksmiths and Carriage Makers

In the "American" you get all the different functions any woodworker can give you, WITH THE FURTHER GREAT VALUE OF "AMERICAN" QUALITY.

You're not buying a woodworker for today or tomorrow, but as a permanent investment of good money to earn good returns. It is the "American" quality in an "American" Woodworker which makes it the "Best Buy" for anyone who wants a real money-making machine.

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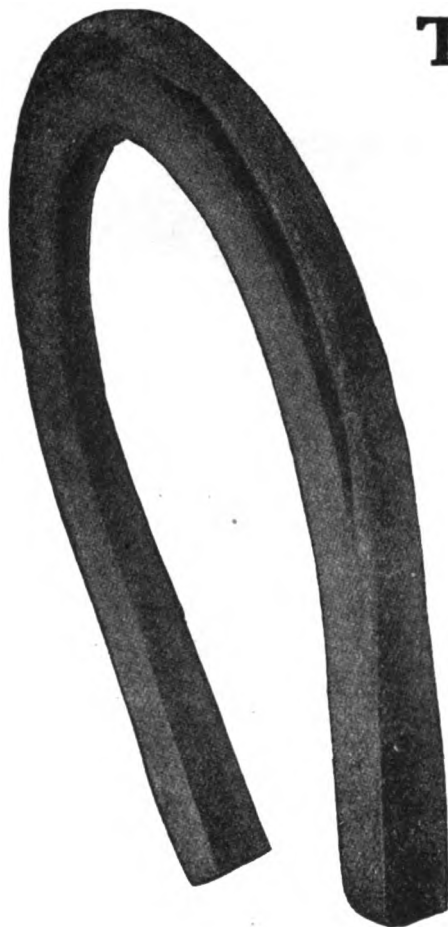


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Blacksmiths have been quick to see the greater value of this new shoe—made by a new process which actually rolls additional metal into the heels.

Have *you* tried the new shoe? Send an order to your jobber today and you will find this shoe what you have been waiting for and wanting for years.

The old style of shoe often meant using shoes that were too heavy for the horse in order to get the right weight at the quarter. You'll never have to do that again if you order American Horse Shoes.

Although there is this additional metal in the heels, the shoe has just the same weight and there is exactly the same number to the keg.

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WEST'S CARRIAGE AND AUTOMOBILE TOP DRESSINGS. For rubber, leather, and imitation leathers. Preserves all tops permanently. Will not get brittle or crackle. Finish equal to new top.

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West Mfg. Co., Rockford, Ill.

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The Latest and by far the Best

It simply bores the hardest spokes like cutting butter. It cuts tenons from 1/4 in. to 1 1/2 in. in diameter, 4 in. long.

They are the easiest of all augers adjusted, being so very simple, possessing as they do many valuable improvements, yet sold at a very reasonable price. Write us for particulars.



For Sale by all Jobbers

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The Perfect Power Hammer



Note the difference in construction over other makes.

Extra Long Guides, insuring a direct movement of the ram without any side motion, which causes guides and springs to break on other hammers.

The only Hammer made with a disk attachment with special anvil for sharpening harrow and plow disks.

A recently invented Friction Clutch fitted with Ball Bearings absolutely controls the operation of the Hammer by foot pressure from the lightest tap to the heaviest blow. This ease of operation makes the hammer particularly well adapted for plow work, as you can get as light a stroke as you desire.

Will ship to any responsible party on approval. If not as represented, no sale.

Made in Two Sizes:

3 inch square, 40 lb. ram—shipping weight, 1,150 lbs.

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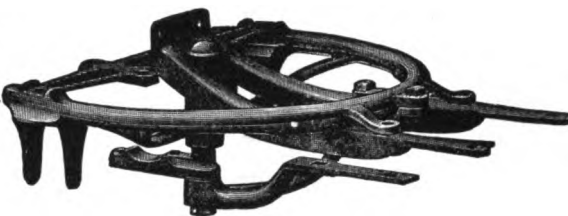
Write any Jobber for Prices, or

**MACGOWAN & FINIGAN
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When Writing to Advertisers Please
Mention The American Blacksmith.

Four Sixty Five



Inquiries for Buggy Fifth Wheels to fit a twelve-inch headblock and axle-cap are increasing.

Some ask why so many of these Fifth Wheels wear out so fast.

A Dayton Fifth Wheel *does not* wear thin in a short time. A Dayton Fifth Wheel can be used to replace other styles of worn out or broken Wheels. It will interchange on the same woodwork, except that a new pair of reaches may be needed.

Ask your Jobber about No. 465-H Dayton Fifth Wheel. This is a Buggy Fifth Wheel, twelve inches in diameter, for one-inch fantail axles and three-quarter or seven-eighth inch reaches.

THE DAYTON FIFTH WHEEL
for Two and Four Passenger
Pleasure Vehicles is sold only
by Carriage Hardware Jobbers.
Send all your orders to them.



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PARK'S WAGON SHOP SPECIAL CIRCULAR RIP and CROSS-CUT SAW

22" Bandsaw, 6" Jointer

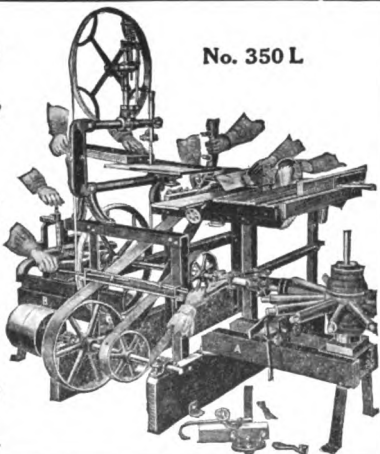
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No Changing

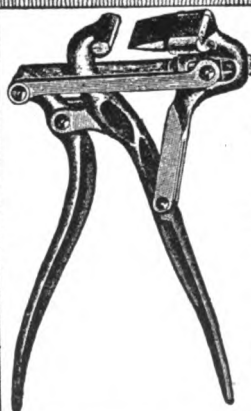
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Write for catalog today.
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**\$1.00 By Parcels
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**The Improved Easy
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Will cut a hoof down easier, quicker and better than any tool you have ever had. Weight 2 1/2 pounds, opening 2 inches, cuts one inch. Thousands of shoers are using the EASY HOOF TRIMMER with great satisfaction.

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The American Blacksmith

Box 974

Buffalo, N. Y.

U. S. A.



How Jack Tweed Met The Price War.

"MORNIN', Tom, how are things in Springville?"

"Blamed dull, Jack. If it weren't y' wouldn't see me here in Holcomb t'day."

"Yes, Tom, most of the smiths think it's dull here, too. I'm busy enough, though."

"Why, y' ain't a cuttin' prices are y' Jack?"

"Not on your life, Tom. I'm raisin' them, if they're movin' at all. And I've stopped worryin' for fear I would have to get in the price war some day. I think I've pretty near got my trade where I want it."

Tom just looked at Jack—and Jack was smiling!

"Walk over to the shop, Tom, and I'll tell y' about it."

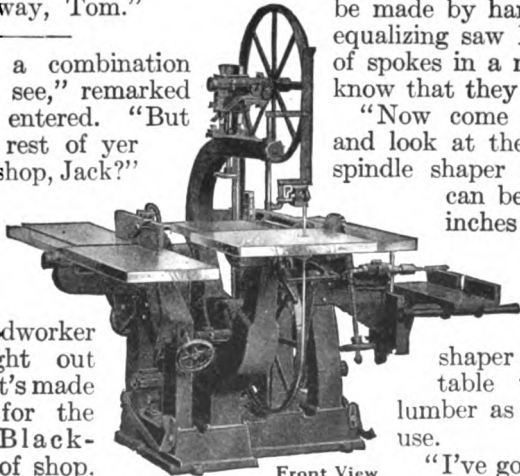
"Blowed yerself to a new sign, I see," said Tom as he looked at a dignified white on black sign over Jack's shop that read, "JOHN TWEED—Blacksmith and Carriage Shop." Then on one side of the doorway he saw "Only Complete Woodworking Shop in Holcomb."

"Well, Jack that's a good one. Haw! haw! Y' don't know any more about woodworking than I do. But it's a fine sign all right."

"Yes," said Jack, "but you're wrong when you say we don't know anything about carriage work. It's not knowledge that we lack so much as the right machines. If you've got them you'll soon get the experience. My shop can handle any woodworking job we're likely to get in Holcomb for the next century. Step this way, Tom."

"Put in a combination machine, I see," remarked Tom as he entered. "But where's the rest of yer 'complete' shop, Jack?"

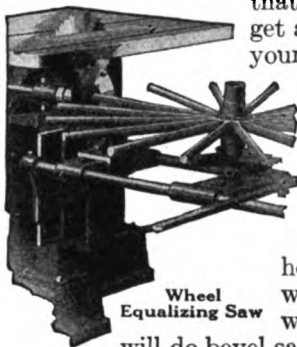
"That's all I need, Tom. It's a new Crescent Universal Woodworker just brought out this year. It's made especially for the Carriage - Blacksmith sort of shop."



Front View

It's lighter and grouped closer together than other woodworkers. Come here and look it over.

"Here's the jointer table. It has a patented round safety head that lets you forget about hurting yourself."



Wheel Equalizing Saw

will do bevel sawing, because the band-saw table can be tilted up to a 45-degree angle.

"Next comes the saw table and it also has a rising front. It will take saws up to fourteen inch.

"The borer with its adjustable table is one of the most useful parts of the machine. There are a whole lot of attachments that can be used with it. I use a spoke tenoner, wheel equalizing saw, disc grinder and emery-wheel.

"The spoke tenoner is a great help on wagon-work. Mounted on this sliding saddle, I can control it by the hand lever and can make tenons much quicker than they can be made by hand. With the wheel equalizing saw I can even up a set of spokes in a minute or two and I know that they are all sawed true.

"Now come around here, Tom, and look at the back. That single spindle shaper is reversible and it can be raised up to seven inches or dropped below the surface of the table, all depending on the work I'm doing. When the shaper table is lowered, the saw table will take as wide lumber as you'd ever want to use.

"I've got the machine belted

from above, but as the main drive pulley is there between the band-saw pulley and the shaper cones, it could just as well be belted from below, rear or at an angle. See this hand wheel—it raises or lowers the jointer table. That offset along the rear side of the jointer table is for rabbeting.

"You don't think of any more machines that I need, do you?" concluded Jack.

"No, I guess it's all there, all right," replied Tom, "but y' must o' spent some money to get it. Ever figure yer overhead?"

"You bet, and I know this woodworker is paying," Jack declared. "It paid me nearly \$60 clear profit last month. I've got a wagon to make and a carriage body to fix now. There's always plenty of repair work, and if it gets kind o' dull I do a little talking with my smithing customers and it isn't long before I get another order for a wagon or a new body.

"Look here, Tom, why don't you put one in your shop? There ought to be nearly as much carriage work around Springville as there is about Holcomb. You've got the room if you clear up that back shop a bit."

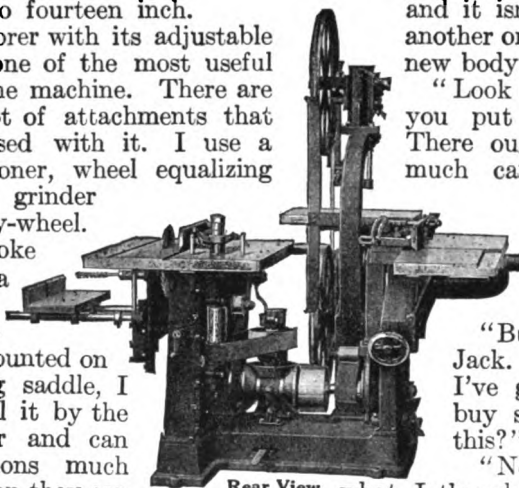
"But I can't afford it, Jack. Where do you think I've got dough enough t' buy such a woodworker as this?"

"Now, Tom, that's just what I thought until I got sensible and wrote to the Crescent Company. They showed me how to do it. Man, you put the woodworker in your shop before Bristow, Hughes and Carpenter get wise, and it will pay for itself while those other smiths are waking up.

"Write to the Crescent Company—you'll find them reasonable. They were more than square with me. See here, If I look up their address will you write them first thing when you get home?"

"Yes, I will, Jack," promised Tom. "If you've made such a success with the machine, I ought to make it, too."

"Here it is, Tom. Right on one of their envelopes—The Crescent Machine Company, 245 Main Street, Leetonia, Ohio. You send 'em a letter and you won't be feeling so blue the next time I see you.



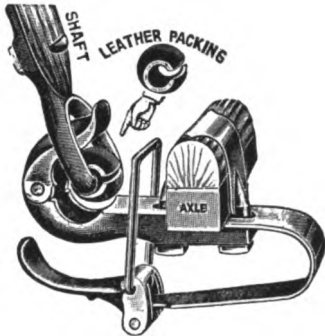
Rear View

Don't YOU think Tom was wise to write the Crescent Company? Then do so yourself.

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THE BRADLEY BALL-BEARING Carriage Coupler



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& Forging Co.**

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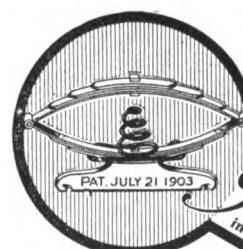
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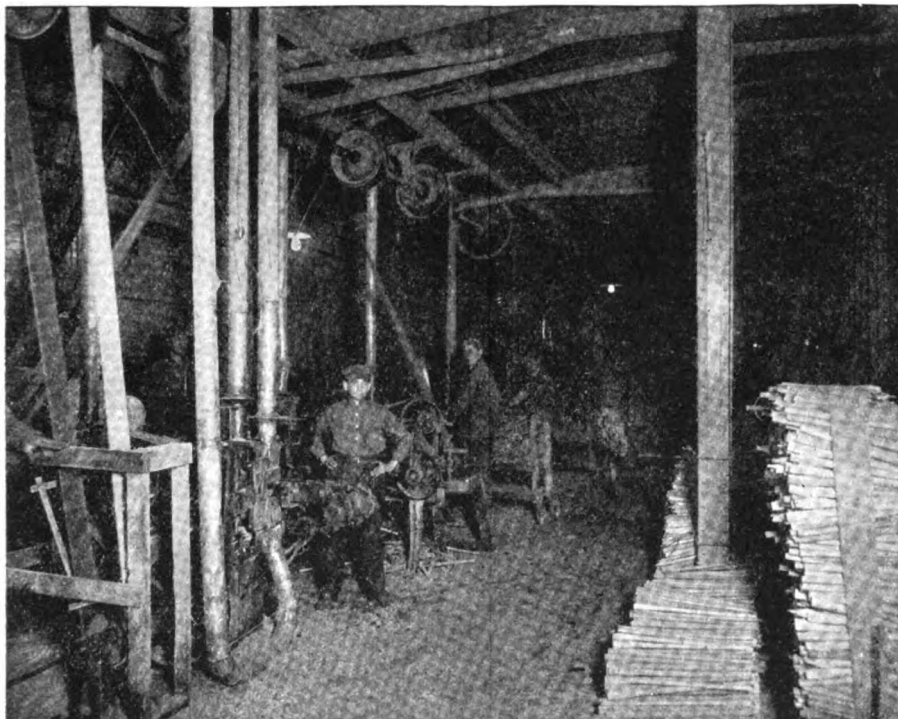
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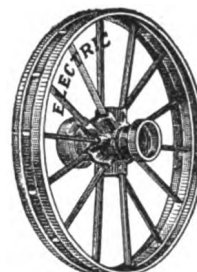
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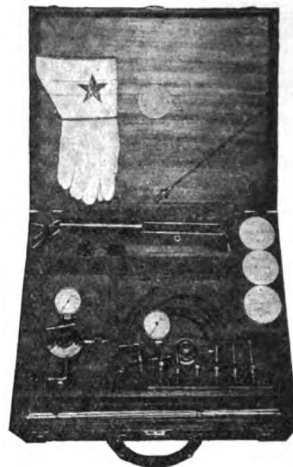
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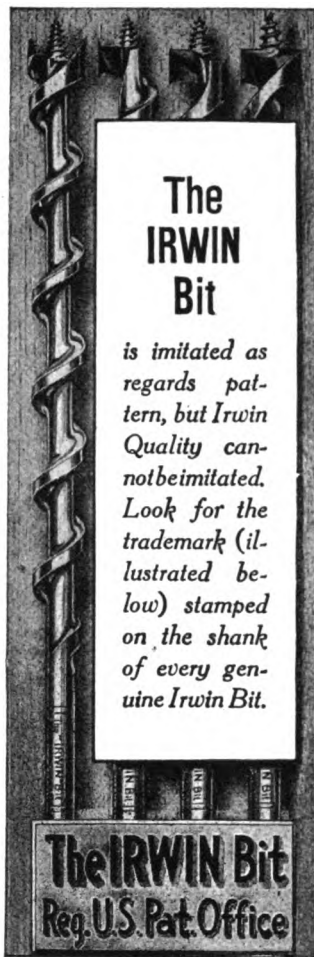
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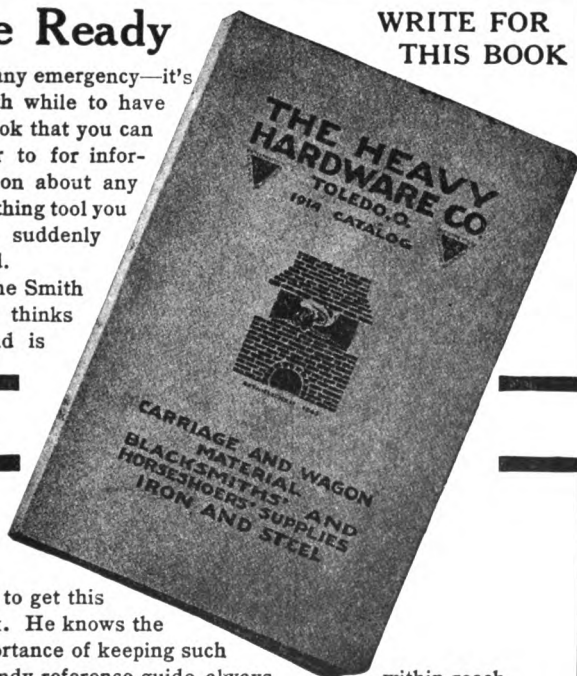
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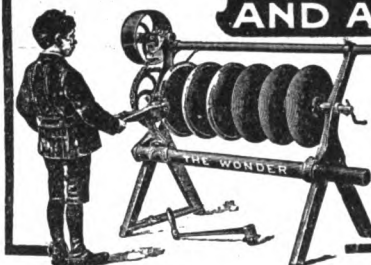
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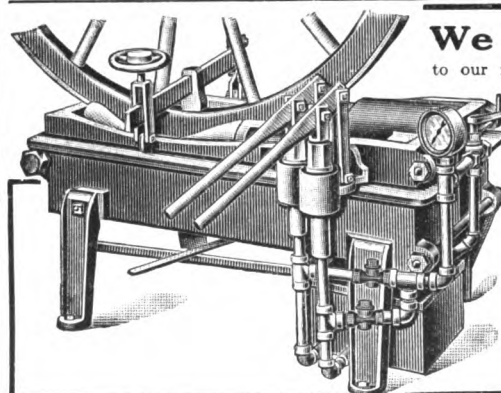
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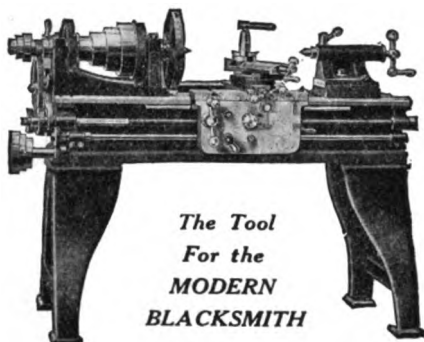
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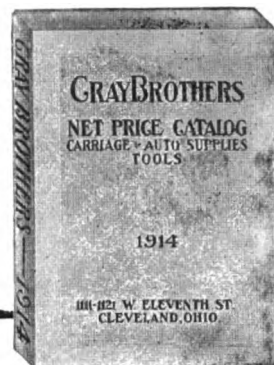
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Think of it, **480 pages of bargains**—about 3,000 illustrations—a complete auto repairers' guide and price maker. Quotes **Lowest Wholesale Prices** on first quality carriage and wagon hardware, automobile supplies, auto repairers' tools, tool kits, spark plugs, horns, lamps, pumps, springs, forgings, brass fittings, batteries, coils, switches, auto tops, and in fact everything used on an Auto or Carriage.

WRITE FOR YOUR COPY TODAY

Sending business card, letterhead, or some other evidence that you are in the trade

GRAY BROTHERS

CARRIAGE HARDWARE AND AUTO ACCESSORIES

1113 W. 11th St. Cleveland, Ohio

U. S. A.



Little Giant

Hexagon Dies

Used with any wrench.



There It Is!

LOOKS Simple, but it Took 5 YEARS to Work it Out.

Over one half the screw thread work of the blacksmith and repair man is in straightening up battered and jammed threads.

The Drayman, in changing his wagon bed, battered the thread on the end of a bolt and can't make the nut go on.

The Farmer, getting out his mowing machine, jammed a thread and the nut won't go on.

So it goes all day long.

Take the Hexagon Die to the bolt (on the machine or wagon) and with a monkey wrench recut the thread. All done in less than a minute.

Ask your dealer for them.

Wells Brothers Company, Division Greenfield Tap & Die Corporation

New York, 107 Lafayette St.

GREENFIELD, MASS.

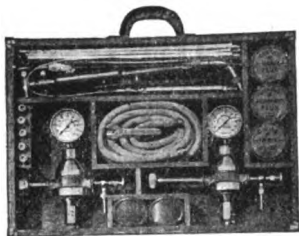
Chicago, 13 South Clinton St.



There's Big Money In It For You

Welding, as you can do it now, means more money for you. It can be done much quicker and you can, therefore, do more of it.

The Cox Combination Welder and Decarbonizer



The automobile offers a bigger variety of work than is possible by the old method—jobs on which the sledge cannot be used. Think of the number of machines that are in use today. They are here to stay and every one means work for you if you will install the equipment with which to do it. You can weld iron, steel, brass, copper, bronze, and aluminum with the Cox apparatus and you can do it quickly. The parts can be made as strong, durable and useful as new in much less time than it takes to get them from the factory.

The Carbon Removing Feature

of the Cox Outfit is also one that will bring in the money. Every automobile must have carbon removed from the cylinders, and for this work you receive \$1.00 a cylinder. A four-cylinder car can be cleaned in 30 minutes; a six-cylinder in 45 minutes. Have you a piece of equipment that will produce a bigger profit? The operation is easy to learn. Instructions furnished.

SEND FOR CATALOGUE "T"

COX BRASS MFG. CO., ESTABLISHED 1872 **ALBANY, N.Y.**

2637 Michigan Ave., Chicago, Ill.

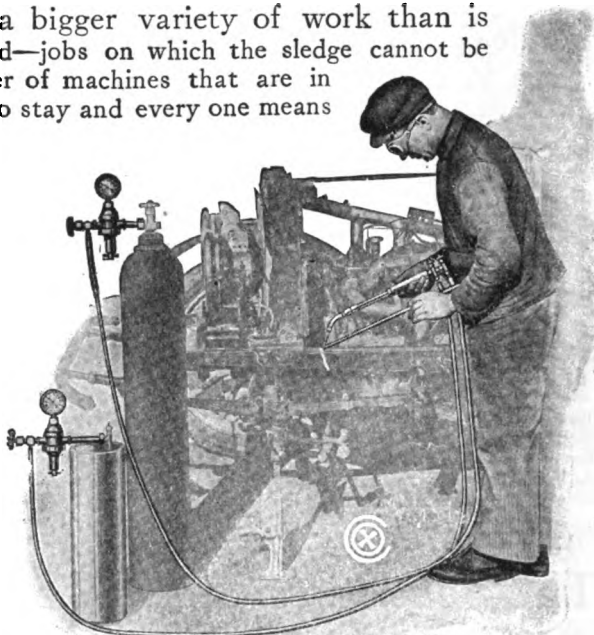
1216 Van Ness Ave., San Francisco, Cal.

169 Massachusetts Ave., Boston, Mass.

Export Representative, Auto Supplies Export Co., 1779 Broadway, N.Y. City.

1777 Broadway, New York City

870 Woodward Ave., Detroit, Mich.



The L. S. P. Calking Machine

THE MACHINE THAT CALKS A SHOE COMPLETE. Don't calk your shoes by hand. It is a big waste of time and money, calking shoes by hand. The work of the L. S. P. Calking Machine is much more satisfactory to yourself and customers. The machine is used every day in the year, on either sharp or blunt work. Used on every shoe you calk. And you are wasting money every day until you have one, whether you are alone or have five men working for you.

The machine that is in use by the U. S. Government.

The machine that is in use in the best shops.

The machine that pleases Bosses, Journeymen, and Customers.

The machine that the users claim more for than the Manufacturer.

The machine you will eventually use.

The machine that was on exhibition at the Master Horseshoers' National Convention at Denver and Indianapolis.

WHAT THE MACHINE WILL DO

With one pull of the lever it will completely make either a sharp or blunt heel calk of any desired length, on any size shoe, with the stock where it is needed, and no galls or cold shuts, producing a perfect calk. One pull of the lever welds either a sharp or blunt toe calk, and forms clip or not, as you may desire. No weld like the pressure weld, no losing of toe calks.

It has a shear to cut off the end of shoe for shodding flat or with pads. It works finely on old shoes and resharpening. It makes the Single or Double Block Heel, or the "Phila. Kink," without the use of hammer or change of dies. And in Changing Dies you have no bolts or screws to bother with; all dies pick right out with the fingers.

The machine is made of the very best material and by the best mechanics, and is fully warranted and guaranteed. Write today for testimonials and prices.

"THE EXTREME OF HAND LABOR IS THE EXTREME OF EXTRAVAGANCE"

The following are two letters like we are receiving nearly every day, not bought, but come without asking:

Birmingham, Ala., Jan. 27, 1914.
L. S. P. CALKING MACHINE CO.,
Wyalusing, Pa.

Gentlemen:—Please find enclosed my check for \$50.00, for another L. S. P. Calking Machine.

The one I have been using for over a year still does as good work as the day I first received it. I do not see how I ever ran a shop without it. Therefore, I am buying this second one to save more time and labor. If I had to buy a new machine every six months I think it would pay me to use one. Please ship this machine as soon as possible.

Yours truly, GIBSON HORSESHOEING CO.

Belmont, N. Y. March 3, 1914.

L. S. P. CALKING MACHINE CO.,
Wyalusing, Pa.

Gentlemen:—

Your calking machine is a dandy. It is all that any man needs in place of an extra man.

Machine works to perfection on all kinds of calks. You cannot recommend it too high.

Yours truly,

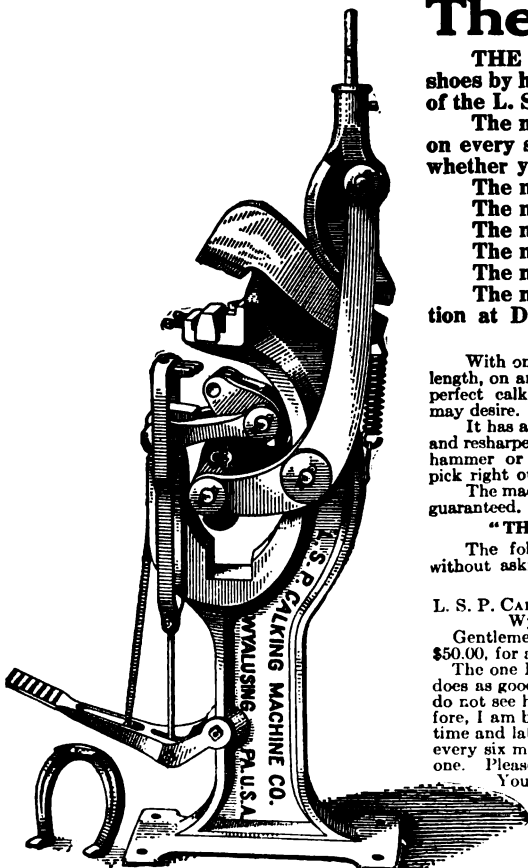
(Signed) GORDON W. BORD.

The L. S. P. Calking Machine Co.

Wyalusing, Pa., U. S. A.

National Machine Co.

Brighton, Ont., Canada





One Pair Tongs IS ALL YOU NEED.

Mr. Shoer:—

If you will give this New Tong a five minute trial we are sure you will not bother with the old style of tool. This is the experience we have had with it so far.



CHAMPION No. 8 UNIVERSAL FARRIERS TONG

Automatically adjusts itself to hold *securely* ANY SIZE OF SHOE.

Nothing to get out of order.

Nothing to do but use it.

SAVES TIME MONEY SPACE

and your temper

YOU can say good by to the large assortment of tongs heretofore necessary.

DROP FORGED FINE SPRING TAPERED REINS

Patented Oct. 15, 1912

New Catalog No. 64
Mailed Free. Send for One

THE CHAMPION TOOL CO.

Meadville, Pa., U. S. A.

THE LIVINGSTON CO.

512 E. 23rd St., New York
Eastern Representative.

Entire Oxy-Acetylene Welding Outfit \$50

Or Welder and Carbon
Remover \$55

You can't beat it at any price

Write Us NOW—Today, for
Particulars

General Welding Co.

349 14th St. Hoboken, N. J.

Pioneer Manufacturers of
Oxy-Acetylene Welding and Cutting
Machines.



ORNAMENTAL WORK

A NEW BOOK BY

THOMAS F. GOOGERTY

Hand Forging and Wrought Iron Ornamental Work, written by Mr. Googerty, who has written so many interesting articles on art work in THE AMERICAN BLACKSMITH. Mr. Googerty covers the subject most thoroughly in this book. He teaches the principles of designing, how to work, how to weld, braze, twist and rivet, how to make lamps, door plates, etc., etc. 208 pages, 122 illustrations; cloth. Postpaid, \$1.00 or 4/6.

If you are interested in ornamental work you'll want this book. Sent postpaid anywhere on receipt of price.

AMERICAN BLACKSMITH COMPANY

Box 974

BUFFALO, N. Y.

U. S. A.

Money Making Opportunity For Blacksmiths

Every repairman knows that there are good profits in welding cast-iron gears and other castings. Also wrought iron, cast steel, drop-forged steel, aluminum, copper, platinum, and brass. You can now handle this work and increase your earnings.

"LITTLE GEM" WELDING MACHINE

This machine is designed especially for the blacksmith shop, garage, or machine shop and, while doing the same work as larger welding plants, costs much less.

Is very simple and does not require an expert mechanic to operate. The generator is entirely safe. Indispensable in welding all kinds of automobile parts. Also can be used for removing carbon from automobile cylinders at a very low cost for operation.

Any blacksmith can make big money by installing our "LITTLE GEM" OXYGEN GENERATING, CARBON BURNING AND WELDING MACHINE. Catalog sent on request.

WRITE TODAY for interesting booklet giving full information about this welding equipment. Sent free to any American Blacksmith reader on request.

Distributors:

Nicols, Dean & Gregg, St. Paul, Minn.

Minneapolis Iron Store Co.,

Minneapolis, Minn.

Robison Heavy Hdw. Co., St. Joseph, Mo.

E. D. Kimball Co., Chicago, Ill.

Burlington Iron Stores Co.,

Burlington, Iowa

Mossman, Yarnelle Co.,

Ft. Wayne, Ind.

Kelly-How-Thomson Co.,

Duluth, Minn.

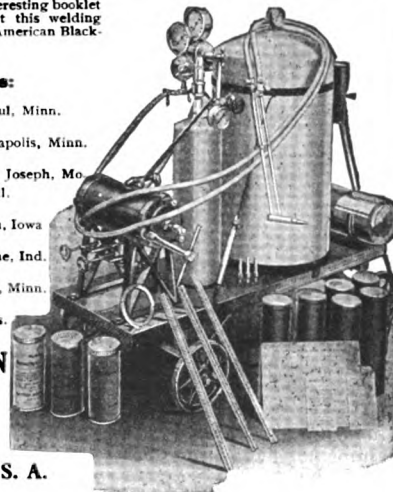
Shattuck-George Iron Co.,

Wichita, Kans.

**RICE & DAYTON
MFG. CO.**

Address Lock Box A

Cedar Falls, Iowa, U. S. A.




\$50. WEEK VULCANIZING TIRES

Any shop owner can make big profits. Business cash. Only small space needed. Vulcanizes any make automobile, motorcycle or bicycle casing or tube. Business easily and quickly learned. Thousands coining money. Unlimited possibilities in vulcanizing business. Miller's Rubber Instruction Book, price prepaid \$2.00.

Send for free circulars and prices

CHAS. E. MILLER, Dept. A.B. Anderson, Ind.



Big Money for Blacksmiths Repairing Auto Tires

No repair shop is complete unless equipped to handle vulcanizing. Right now is the time to start in this profitable business. No experience is necessary.

Hill-Stage Vulcanizers

ALL SIZES, FOR TIRES AND TUBES.

The most complete, compact vulcanizing plants ever made. Larger capacity and low operating cost make these vulcanizers big money-makers for the shop owner.

Write today for Circulars giving full information.

WE OFFER LIBERAL TERMS.

Hill-Stage Company

Anderson, Ind. U. S. A.



\$4.00 Satin Lining FREE

Of course you are going to have a new fall suit—but why pay \$20 to \$30 for merely ordinary ready made garments when you can get a classy

Made-to-Measure, All-Wool BLUE SERGE SUIT for \$15

the greatest value ever offered in a high-grade blue serge suit, tailored to your individual measure for only \$15.

We Guarantee to Please You in tailoring, materials, fit and style or you don't pay us one cent. To get your business we will line the first suit with \$4 satin lining free and

We Pay Shipping Charges Send today for our big book with 70 liberal samples plain and fancy woolsens, new fall styles all FREE. We employ no agents.

We Save You Big Money

BERNARD-HEWITT & CO.

Desk 439 564 W. Monroe St. Chicago.



TRADE LITERATURE & NOTES.

Many new channels for making money have been opened up to the Blacksmith by the wonderful growth of the automobile industry. One of these opportunities is automobile tire repairing which has been taken up by many smiths who find it a good help in enlarging the weekly profit margin. It can be handled without any special training or experience in tire work. Shaler Vulcanizers, which have been advertised in "Our Journal" for several months, are giving good service in the leading garages and repair shops throughout the country. There is a complete line of these vulcanizers, from a small outfit that can be used by an individual motorist, to large equipments that will furnish all the necessary equipment for a busy tire shop. The makers claim that with a Shaler

I Want Blacksmiths and Horse Shoers to Try This Big Can of CORONA WOOL FAT 20 Days FREE

Just send me a Post Card—Try this wonderful healing compound on any case you have in your shop—then if satisfied send me only 50 cents, and be my agent in your locality. I take all the chances of satisfying you FIRST—then give you a chance to make big money selling to your trade. I furnish cabinet case, display cards, posters, etc, for shop use.



CORONA Wool Fat

Will cure Hard and Contracted Feet, Mud Fever, Split Hoofs, Corns, Grease Heel, Ring Bone, Scratches, Quarter Crack, Barb Wire Cuts, Sore Tests of Cows, Ulcers and Old Sores.

DON'T SEND MONEY—But write me a post card or letter saying you want to try Corona Wool Fat on this 20-day offer. (11)

Carried in Stock by all Leading Jobbers

Address: C. G. PHILLIPS, The Wool Fat Man

THE CORONA MFG. CO., 4611 Corona Block, KENTON, OHIO

Give name of your Iron Store Jobber.

Vulcanizer, any puncture, blow-out, tear or hole in casing or inner tube can be repaired in a few minutes. The success of these machines it is said is due to their working automatically which prevents all danger of over-curing or under-curing the tire.

"The Care and Repair of Tires" is the subject of an interesting booklet which will be sent free together with other valuable information about the possibilities and large profits of tire repairing. To obtain this information, address the C. A. Shaler Company, 1702 Fourth Street, Waupun, Wis.

An important addition to the plant of Butterfield & Company in Rock Island, Quebec, Canada, will be completed by the first of the year. The new building will be 185 feet long, 60 feet wide and three stories in height. A portion of the new building will be used for manufacturing twist drills and milling cutters. Butterfield & Company have been known to the Smithing trade for many years as the manufacturers of stocks and dies, solid die plates, screw plates, taps and reamers, and this firm has an interesting advertisement in this issue.

An example of the helpful suggestions often contained in catalogs has just come to hand in a new catalog issued by the Cox Brass Manufacturing Company, makers of oxy-acetylene welding outfits. The following paragraphs are taken from a special page in this catalog, addressed "To the Blacksmith":

"Welding is the Blacksmith's job. He is the man fitted to do the work. Being a mechanic of ability and having the proper equipment in his shop to handle the various jobs, he is the one to whom the people naturally come for welding. The experienced Blacksmith is familiar with the heats and conditions necessary for welding. It is only a matter of a little practice for him to become very apt in the handling of the welding torch.

"Why then should he not branch out or rather follow the trend of the times and make his share of profit out of the welding work which is being distributed in his section? Those who gave him work in the days of the horse, will undoubtedly be glad to call on him to weld together the automobile parts that often break when they are needed most, and also to remove the carbon from the cylinders of automobiles, by the oxygen process, which is a job that must be done to obtain best results from the engine and on which a good profit is made."

This catalog is an extremely instructive book and is unusually well printed and

illustrated. It will be a valuable aid to any Smith. A free copy will be sent to every reader who writes to the Cox Brass Mfg. Co., Albany, New York.

In issuing a new price list, The Giant Grip Horse Shoe Company has included some general suggestions on shoeing, in an attractive booklet that is worth sending for. The book contains some valuable "don'ts." Prices and information about Giant Grip Calks are also given. A free copy may be obtained by writing to The Giant Grip Horse Shoe Company, Oshkosh, Wisconsin.

Smiths who are endeavoring to save as much time as possible in each operation that takes place in their shop will be interested in the Bumper Calking Machine which is made by Cartwright & Baer. An attractive circular has been issued describing the machine from which the following paragraphs are quoted:

"In this day and age of the world, your customers demand their work done quickly. This machine saves 80 per cent of the hammer work in shoeing a horse.

"When you invest your money for the purchase of this machine, you may consider it an investment for help; this helper is competent to put up the best heel calk, to make the best welds on toes and in rush of sharpening or in a busy shop it is the real thing to save time and hard work."

A free copy of this interesting circular as well as other information about the Bumper Calking Machine will be sent all Smiths writing to Cartwright & Baer, Bancroft and Smead Avenues, Toledo, Ohio.

One of the unusual advertisements in this issue is the announcement of the Bernard, Hewitt Company of Chicago that they will make to any Blacksmith's order an all wool, blue serge suit for \$15.00. While this advertisement is somewhat out of the ordinary run of trade announcements, it is an offer worthy serious thought by any reader who is planning on a new suit this fall.

In order to show the quality of the materials which this company uses, they offer to send seventy samples of various newly designed woolen patterns, and have prepared a complete style book which will also be sent free. This firm's entire business is with the consumer direct which enables them to offer exceptional values, they say, at prices much lower than can be charged by the average retailer. To receive a free copy of the style book and the samples, address the Bernard, Hewitt Co., desk 439, 564 W. Monroe Street, Chicago.

(Continued on page 44)



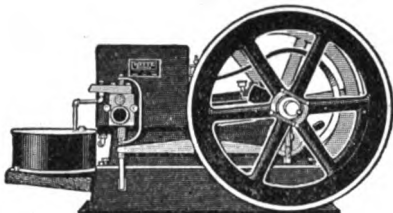
Get My Latest Engine Offer

Let a WITTE earn its own cost while you pay for it. Take full 60 days' Free Trial to prove its big value.

Five - Year Guaranty

I unqualifiedly guarantee every WITTE engine for five years against defects and consequent faulty operation. I carry the risk, as I have done for my thousands of customers during 27 years.

Ed. H. Witte.



WITTE Engines

Kerosene, Gasoline, Distillate, Gas

All styles 2 to 22 H-P. Used and recommended by shop, mill and factory men all over the earth. All my life I have been a shop man, making my own engines. I sell only what I make. That is why, for 27 years, WITTE engines have always made good and stay good.

Look at These Prices!

4 H-P.,	\$ 69.75
6 H-P.,	99.35
8 H-P.,	139.65
12 H-P.,	219.90

Other sizes proportionately low. WRITE FOR MY FREE BOOK, and all about my New Liberal Offer, BEFORE you arrange to try any engine. I save you money, besides giving you the easiest chance to get the best engine service. Write me to show you.

ED. H. WITTE, Witte Iron Works Co.

1769 Oakland Ave., Kansas City, Mo.

FEDERAL HORSE SHOE PADS

Built for Quality and Service

We make Horseshoe Pads of all types, with leather, canvas or composition backs. If unable to secure them from your supply house,

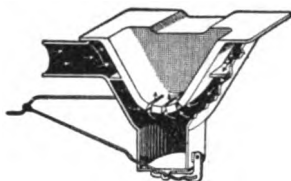
Write Us for Samples and Prices

FEDERAL RUBBER MFG. CO.

Milwaukee, Wis.

Branches and Distributors in all Principal Cities

The Barcus Tuyere Iron



is constructed on the well known principle that it is better to blow the fire with hot air than cold air, as it is not only a saving of about 20% in fuel, but

also overcomes the oxidizing or scale forming on the heated iron, caused by the cold blast of air coming in contact with the heated iron. It also saves time in heating the iron.

WRITE US FOR PRICES, ETC.

Don't Wait Until It Is Too Late

INSTALL A

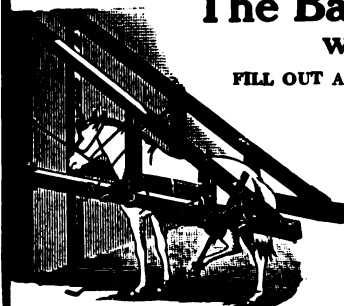
BARCUS HORSE STOCK

now and do away with the danger of broken bones or possibly a fatal kick. A machine perfect in every detail, easily and quickly operated, strong and simple, which give absolute control over the most vicious animal. They insure safety to both man and beast and are guaranteed to give satisfaction or money refunded.

The Barcus Mfg. Co.

Wabash, Ind.

FILL OUT AND MAIL COUPON AT ONCE.



Please send me full particulars regarding your Horse Stocks without any obligation on my part.

Name.....

Town.....

State.....

Miltrena Blacksmithing Coal

The Most Perfect Fuel

High in carbon with low ash and sulphur content, and high fusing temperature of ash insures efficient and economical work. With very moderate prices in order to introduce this fuel, it will pay you to investigate fully. Free samples.

Smokeless Fuel Company

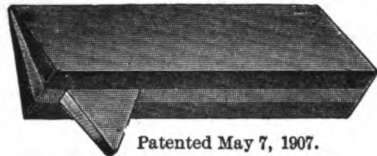
Union Trust Bldg.

Cincinnati, Ohio



CLASSIFIED BUYER'S GUIDE.

For Alphabetical Index to Advertisers, see page 17.



Patented May 7, 1907.

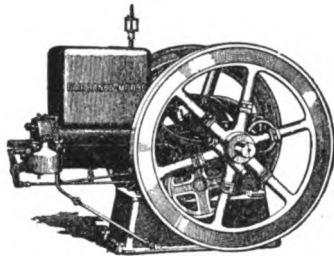
**LUDVIGSEN BROS.
WELDED STEEL CENTER
TOE CALKS.**

It is a self-sharpening Calk. The hard steel plate in the center and the two outside soft iron plates are welded together and shaped to a sharp Calk.

Sample sent on request.

Address

LUDVIGSEN BROS.,
JACKSON, MINN.
or 47 Second St., MILWAUKEE, WIS.

**OIL ENGINE
RELIABILITY**

depends as much on the right *principles* as on proper construction. These are combined in the Fairbanks-Morse Type "H" Oil Engines, which with their **BUILT-IN MAGNETO and THROTTLING GOVERNOR** have the two elements necessary to proper oil engine operation. Let us know your needs.

Fairbanks, Morse & Co.
900 S. Wabash Ave. CHICAGO
487-20E.

CUMMINGS & EMERSON

Blacksmith and Wagon Makers' Supplies
PEORIA, ILL.

HONEST DEALINGS

Before a display advertisement is accepted for this Journal, inquiry is made concerning the standing of the house signing it. Our readers are our friends and their interests will be protected. As a constant example of our good faith in *The American Blacksmith* advertisers, we will make good to subscribers loss sustained from any who prove to be deliberate swindlers. We must be notified within a month of the transaction giving rise to the complaint. This does not mean that we will concern ourselves with the settlement of petty misunderstandings between subscribers and advertisers, nor will we be responsible for losses of honorable bankrupts, nor can it include advertisements under the head of "Wanted and For Sale."

Anvils	Page	Coal	Page	Gears	Page
Columbus Anvil & Forging Co.	16	Pennsylvania Coal & Coke Corp.	3	Akron Sells Co.	34
Columbus Forge & Iron Co.	7	Smokeless Fuel Co.	39	Herby & Sons, J.	44
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		Decarbonizing Outfits		Mayer Bros.	50
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Blowers, Electric		Kerrihard Co.	7	American Horseshoe Co.	12
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Canedy-Otto Mfg. Co.	6			Larsen & Nielsen.	40
Champion Blower & Forge Co.	48	Drilling Machines, Hand and Power		Phoenix Horseshoe Co.	5
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A. Wheel, Top and Hdw. Co.	10	Fairbanks, Morse Co.	40	Iron	
C. C. Bradley & Son.	16	The Wm. Galloway Co.	49	Beals & Co.	42
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Buffalo Forge Co.	46	Engines, Kerosene		Campbell Iron Co.	40
Canedy-Otto Mfg. Co.	6	Fairbanks, Morse & Co.	40	Cray Bros.	35
Champion Blower & Forge Co.	48			Cummings & Emerson.	40
Goodell Mfg. Co.	8	Fifth Wheels		Heavy Hardware Co.	33
Clipping Machines		Dayton Malleable Iron Co.	13		
Chicago Flexible Shaft Co.	40	Files and Rasps		Lathes	
		Heller Bros. Co.	44	Sebastian Lathe Co.	35
		Nicholson File Co.	18		
		Forge Chimneys		Lighting Systems	
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		Forges			
		Buffalo Forge Co.	46		
		Canedy-Otto Mfg. Co.	6		
		Champion Blower & Forge Co.	48		
		Silver Mfg. Co.	2		

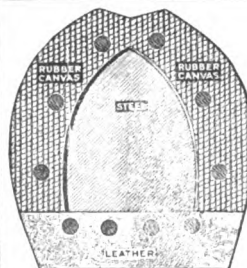
"You will surely be interested in the new catalogue we have published, illustrating and describing Blacksmith and General Shop Supplies. Write for it on your business stationery, addressing it to Dept. No. 2.

The Campbell Iron Co.
811 Cass Ave., St. Louis, Mo.

Make Money--Clip Horses

A complete Stewart No. 1 Clipping Outfit costs you only \$7.50. Horses should be clipped and you can Make good Money by being equipped to take care of this work.

Send \$2.00 today and we will ship this machine, balance C. O. D. Circulars free on request.
Chicago Flexible Shaft Co.
186 Ontario Street CHICAGO, ILL.

**Protect Horses' Feet.**

For preventing horses from picking up nails, and injuring their feet, by glass or sharp stones, use—

Larsen's Nail-Proof Hoof Pads

Your dealer handles them. If not, we will supply you direct.

Write for Circulars and Low Prices
Free on Request

LARSEN & NIELSEN
3759 Wabansia Ave., Chicago, Ill., U.S.A.



**ABSORBINE**
TRADE MARK REG. U.S. PAT. OFF.

will reduce inflamed, swollen Joints, Sprains, Bruises, Soft Bunches; Heals Boils, Poll Evil, Quittor, Fistula, or any unhealthy sore quickly as it is a positive antiseptic and germicide. Pleasant to use; does not blister under bandage or remove the hair and you can work the horse. \$2.00 per bottle, delivered. Book 7 K free.

ABSORBINE, JR., antiseptic liniment for mankind. Reduces Painful, Swollen Veins, Goitre, Wens, Strains, Bruises, stops pain and inflammation. Price \$1.00 per bottle at dealers or delivered. Will tell you more if you write. Manufactured only by W. F. YOUNG, P. U. F., 230 Temple St., Springfield, Mass.

SQUARE HOLE DRILL

A New, Simple and Practical Tool, Just Perfected

**FOR WOOD, METAL OR MARBLE**

Fits chuck in any brace, drill press or lathe and by circular motion drills a square hole at one operation. Made of high grade steel, fully guaranteed. Sizes, 1/4 inch to 3/4 inch, in sixteenths. When ordering, state size and kind (whether for wood, metal or marble.)

Price \$1 per set of Drill and Guide, delivered anywhere. BARNETT TOOL CO., 1693 Hyde St., San Francisco, Cal.

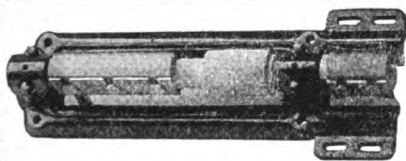
Triumph Light

EVERYBODY WANTS BETTER LIGHT. HERE IT IS

This new 100 to 700 candle power light turns up and down like gas. One-third cost of electricity, gas or kerosene. For home, church or store. Write for A. B. Catalog. Agents Wanted.



Brilliant Gas Lamp Co. No. 1009 S. Wabash Ave., Chicago, Ill.

**SAFETY FIRST.**

What is Safety with Efficiency worth to you? With Sherwood's No. 88 outfit, 9 in. jointer and 4 in. rounding head in your shop, this question is solved.

Your name and address will bring illustrated circular and prices of this and of other specialties for the woodworker.

W. L. SHERWOOD

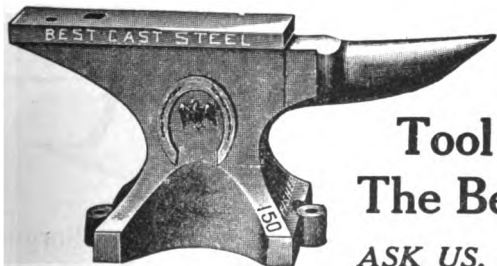
Kirkville, Mo.

Magnetos	Page	Shears	Page	Tuyere Irons	Page
Knoblock-Heideman Mfg. Co.	34	Bertsch & Co.	34	Buffalo Forge Co.	46
Oxy-Acetylene Welding Outfits		Buffalo Forge Co.	46	Champion Blower & Forge Co.	48
Cox Brass Mfg. Co.	36	C. D. Edwards	8	Varnishes	
Metals Welding Co.	18	Little Giant Punch & Shear Co.	47	Felton, Sibley & Co.	18
Paints		Simonsen Iron Works	42	Vehicle Parts	
Felton, Sibley & Co.	18	Spoke Machines		American Veneer Co.	8
Lowe Bros. Co.	47	Silver Mfg. Co.	2	Cray Bros.	35
Patent Attorneys		Springs		Veterinary Remedies	
Chandlee & Chandlee	34	Harvey Spring Co.	8	Corona Mfg. Co.	38
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C. L. Parker	34	Bourne Fuller Co.	11	Columbus Forge & Iron Co.	7
Randolph & Co.	34	Beals & Co.	42	Fisher & Norris	41
Poles and Shafts		Steel Shapes		Millers Falls Co.	16
A. Wheel, Top & Hdw. Co.	10	Crescent Forge & Shovel Co.	8	Prentiss Vise Co.	34
Crandal, Stone & Co.	52	Star Manufacturing Co.	33	Vulcanizers	
Printers		Stocks and Dies		Chas. E. Miller	38
Hausauer-Jones Printing Co.	8	Butterfield & Co.	44	National Cement & Rubber Co.	42
Pulleys		Canedy-Otto Mfg. Co.	6	Welding Compound	
W. A. Jones Fdry & Machine Co.	52	Champion Blower & Forge Co.	48	Anti-Borax Compound Co.	4
Punches		Hart Mfg. Co.	52	Cortland Welding Compound Co.	8
Bertsch & Co.	34	Wells Bros Co.	35	Welding Outfits	
Buffalo Forge Co.	46	F. E. Wells & Son Co.	7	Cox Brass Mfg. Co.	36
Little Giant Punch & Shear Co.	47	Wiley & Russell Mfg. Co.	9	Economy Welding Co.	45
Rasps (See Files)		Tailors		General Welding Co.	37
Rubber Tires		Bernard-Hewitt & Co.	38	Rice & Dayton	37
Federal Rubber Mfg. Co.	39	Tenoning and Boring Machines		Well Drilling Machine	
Saws, Band		Silver Mfg. Co.	2	Keystone Drill Makers	49
Crescent Machine Co.	15	Tire Heaters		Wheels, Wood	
Silver Mfg. Co.	2	West Tire Setter Co.	47	A. Wheel, Top & Hdw. Co.	10
Saws, Hack		Tire Setters		Carriage Wheel Supply Co.	4
Millers Falls Co.	16	House Cold Tire Setter Co.	13	Cray Bros.	35
Screw Plates		Keokuk Hydraulic Tire Setter Co.	34	Wheels, Metal	
Butterfield & Co.	44	Lourie Mfg. Co.	52	Electric Wheel Co.	17
Hart Mfg. Co.	52	West Tire Setter Co.	47	Empire Mfg. Co.	42
Wells Bros Co.	35	Tire Shrinkers		Muncie Wheel Co.	17
F. E. Wells & Son Co.	7	Buffalo Forge Co.	46	Wood Working Machinery	
Wiley & Russell Mfg. Co.	9	Canedy-Otto Mfg. Co.	6	Am. Saw Mill Machinery Co.	11
Shaft Couplings		Champion Blower & Forge Co.	48	Buffalo Forge Co.	46
C. C. Bradley & Son	16	Tongs		Crescent Machine Co.	15
Shaft Ends		Champion Too Wks.	37	Millers Falls Co.	16
Crandal, Stone & Co.	52	Tepe and Trimmings		Parks Ball Bearing Mach. Co.	13
		A. Wheel, Top & Hdw. Co.	10	Sidney Tool Co.	9
				Silver Mfg. Co.	2
				John Whisler	8
				Wrenches	
				Geo. A. Cutter	49

When Writing to Advertisers Please Mention The American Blacksmith.

1843 "EAGLE" ANVILS 1914

Genuine Tool STEEL FACE—Will Not Settle!
NEVER KNOWN TO BREAK AT WAIST

**"FISHER" VISES**

Tool Steel Jaws--Guaranteed
The Best Type for Every Service

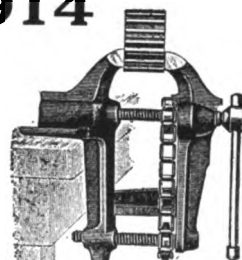
ASK US, OR YOUR DEALER

FOR ATTRACTIVE PRICES.

Horseshoers' Special

FISHER & NORRIS

35 Fair St.

TRENTON, N. J.

"Fisher"
Leg
Vise

Practical
and
Reliable



Current Heavy Hardware Prices.

The following quotations are the lowest prices generally prevailing, August 10, 1914. They are subject to change without notice, and higher prices are charged according to quality specifications and other conditions.

There have been no changes in Current Heavy Hardware Prices since our previous report. While Steel Bars are reported much firmer at the mills, no advance is looked for in warehouse prices.

Business, with few exceptions, is reported from all parts of the country as very good—in fact, some shops are reporting that they are rushed and are having difficulty to keep up with the work coming in. The reports of poor business are few and far between.

Collections are also reported as good, every one seemingly making an extra effort to make them good. Crop conditions are still continuing excellent, and everything points to a decidedly favorable fall season.

Horse Shoes—

All Iron Shoes.....	\$4.00
Steel Shoes.....	4.00
No. 0 and No. 1, 25c. extra. 15c. per keg additional charged for packing more than one size in a keg.	
Mule Shoes.....	4.90
X. L. Steel Shoes.....	5.50
Countersunk Steel Shoes.....	5.25
Tip Shoes.....	5.75
Goodenough, heavy.....	6.00
Goodenough, sharp.....	6.50
Toe Weight.....	7.00
Side Weight.....	9.25
E. E. Light Steel.....	5.00
Steel Driving.....	5.50
O. O. Mule Shoes, extra.....	1.50

Anvils.....

Merchant Bar Iron—

\$1.80 rates, full extras, and 20 cents per 100 pounds extra for broken bundles.

Steel Bars—

\$1.80 rates, full extras.

Toe Calks—

Blunt.....	Per Box \$1.25
Sharp.....	1.50

Screw Calks—

	1/4"	3/8"	1/2"	3/4"	1"
Blissard M.....	\$18.00	\$18.00	\$20.00	\$20.00	\$22.00
Sure Grip M.....	18.00	18.00	20.00	20.00	22.00
Bl. D'md M.....	18.00	18.00	20.00	20.00	22.00
Red Tip M.....	20.00	20.00	22.00	22.00	24.00
Rowe, Jr. M.....	18.00	18.00	20.00	20.00	22.00
R. Rg. Pt. M.....	20.00	20.00	22.00	22.00	24.00

Plow Lays—

Solid Cast.....	\$.08 1/4
Crucible.....	.09 1/4
Soft Center.....	.12 1/4

Fitted Plow Lays—

Crucible, 12".....	\$1.50
Crucible, 18".....	1.90
Soft Center, 12".....	1.90
Soft Center, 18".....	2.45

Quick Repair Lays—

Crucible, 12".....	\$1.40
Crucible, 18".....	1.70
Soft Center, 12".....	1.80
Soft Center, 18".....	2.25

Hickory Lumber—Per Foot—

1 to 2 1/2.....	\$.10
2 1/2 to 4 1/4.....	.12

Ash and Oak Lumber—Per Foot—

1-1 1/4.....	\$.08
1 1/4-2.....	.08 1/2
2-3.....	.09
3-4.....	.10

Yellow Poplar Lumber—Per M. Feet—

	6 to 12	13 to 17	18 to 24
1/2".....	\$75.00	\$75.00	\$85.00
3/4".....	75.00	78.00	90.00
1".....	78.00	85.00	95.00
1 1/4".....	85.00	90.00	114.00

Rough Hickory Axles—

	Each
3 x 4 x 6 ft.....	\$.75
3 1/2 x 4 1/2 x 6 ft.....	1.00
4 x 5 x 6 ft.....	1.30
5 x 6 x 6 ft.....	2.40
4 x 5 x 6 1/2 ft.....	1.75
4 1/2 x 5 1/2 x 7 ft.....	2.30
5 x 6 x 7 ft.....	2.80
5 x 7 x 7 ft.....	3.40

Finished Hickory Axles—

	\$.95
For 2 1/2 and 2 3/4 Skeins.....	1.10
For 3 Skeins.....	1.35
For 3 1/2 Skeins.....	1.50
For 3 3/4 Skeins.....	1.80
For 4 Skeins.....	2.10

Rough Oak Bolsters—

	x 4	x 4 1/2	x 12	x 14	x 16
3 x 4.....	\$.36	\$.40	\$1.30	\$1.35	\$1.75
4 x 5.....	.60	.70	2.20	2.55	3.00
5 x 6.....	1.00	1.20			

Finished Oak Bolsters—

2 1/2 x 3 1/2 and under.....	\$.60
3 x 4.....	.65
3 1/2 x 4 1/2.....	.80

Rough Oak Wagon Tongues—

4 x 4 x 2 x 4 x 12 and smaller.....	\$1.15
-------------------------------------	--------

Finished Oak Wagon Tongues—

3 1/2 and smaller.....	\$1.35
3 1/2.....	1.45
4.....	1.55

Two-Inch Sawed Hounds

	Per Pair
Tongues.....	\$.35
Front.....	.40
Hind.....	.50

Wheels—

Sarven Patent—white—not tired.....	50%
Tiring—No. 13 and less.....	45%
Tiring—No. 17 and larger.....	30%
Screws 1 1/2" Thread and less.....	50%
Rivets 1 1/2" Thread and less.....	40%
Screws or rivets 1 1/2" and heavier.....	40%
Boring or Boxing less than 10 cent lots.....	40%
Boring or Boxing 10 sets or more of one size.....	60%
Priming wheels net.....	25c
Oiling not tired, set.....	20c
Allowance of 25c per set on all special tired wheels with three or four piece rims.....	
Oiling, not tired, No. 17 to No. 39.....	25c
Oiling No. 45 and larger.....	40c

Special Wheels Tired—

No.	Tire	Per Set	No.	Tire	Per Set
0	1/4 x 1/4"	\$6.80	9	1 1/2 x 1/4"	\$8.95
1	1/2 x 1/4"	7.05	9	1 1/2 x 1/4"	9.40
3	1 x 1/4"	7.40	13	1 1/2 x 1/4"	11.60
3	1 x 1/4"	7.65	13	1 1/2 x 1/4"	12.00

Cupped Oak Hubs—Set

7 x 8 x 9.....	\$1.30	10 x 14.....	\$3.30
7 x 9 x 10.....	1.50	11 x 14.....	4.20
8 x 9 x 10.....	1.55	11 x 15.....	4.50
8 x 10 x 11.....	1.80	11 x 16.....	5.10
9 x 10 x 11.....	1.85	12 x 16.....	5.75
9 x 11 x 12.....	2.00	12 x 17.....	6.30
10 x 12 x 13.....	3.00	13 x 18.....	7.00
11 x 13 x 14.....	4.20		
12 x 14 x 15.....	5.10		

Rough Sawed Felloes—

1 1/2 x 2".....	\$1.70	2 x 2 1/2".....	\$2.10
1 1/2 x 2 1/2".....	1.90	2 1/2 x 2".....	4.60
1 1/2 x 2 1/2".....	2.00	3 x 3".....	5.50
3 x 3 1/2".....	\$5.75		

Ironed Poles, White, XXX—

1 1/2 x 2 1/2" No. 2.....	\$3.80
2 x 2 1/2" No. 3.....	3.80

Ironed Shafts, White, XXX—

1 1/2 x 2" and smaller.....	\$1.95
1 1/2 x 2".....	2.20
1 1/2 x 2 1/2".....	2.70

Farm Wagon Bows—

Round Top, 1/2 x 2".....	\$.60
Flat Top, 1/2 x 2".....	.75
Round Top, 1/2 x 2 1/2".....	1.35

Standard Size Piano Bodies with Seats—

Each.....	\$4.25
-----------	--------

Plow Beams—

1 Horse.....	\$.60
2 Horse.....	.75
3 Horse.....	1.10

Spokes and Rims—

Oak and Hickory Spokes, Net on Weis & Lash List No. 6.....	
Finished Rims—XX—1/4".....	\$1.50
Finished Rims—XX—1".....	1.65
Oak Rims—Discount.....	40-10%
Hickory Rims.....	40%

Wagon Neckpoke Woods—

Keller & Tamm's List—Discount.....	25%
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Wagon Whiffletree Woods—All Grades

Keller & Tamm's List—Discount.....	25%
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Oval Plow Doubletrees—

2 1/2 x 36".....	\$1.60	1 1/4 x 3 1/2 x 42".....	\$2.75
3 x 40".....	2.40		

Wagon Evener Woods—

2 x 4 and 2 x 4 1/2—Keller & Tamm's List—Discount.....	30%
Larger.....	25%

Buggy Evener Woods—All Grades

Keller & Tamm's List—Discount.....	25%
------------------------------------	-----

Buggy Whiffletree Woods—

Mixed Second Growth and Second Growth—Keller & Tamm's List—Discount.....	20%
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Buggy Neckpoke Woods—All Grades

Keller & Tamm's List—Discount.....	20%
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Butcher Knives Made for Blacksmiths.



Stamped With Your Own Name in \$5.00 Assortments. We sell by mail only, and to only one smith in each town. Every knife warranted. Write for information and send for catalog. WOODWORTH KNIFE WORKS, Sunda, N. Y.



SIMONSEN Hot Trimming Shear

Handiest Tool For Cutting Hot Iron And Plow Steel About The Forge. Ask any jobber or write us for circulars showing this, and our all wrought shears for cold shearing.

SIMONSEN IRON WORKS
Box 671
Sioux Rapids, Ia., U.S.A.

Sterling Horse Shoe Pads

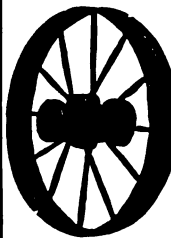
NONE BETTER
Write for Prices

Beals & Company Buffalo, N. Y.

Iron, Steel, Hardware, Blacksmiths' and Wagon Makers' Supplies.

Largest Stock in New York State

STEEL WHEELS



To Fit Any Wagon
Plain or Grooved Tire

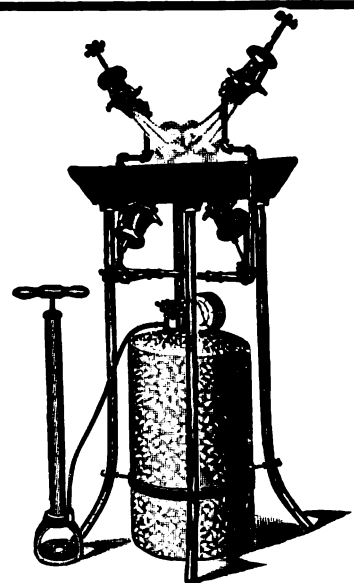
Farmer's Handy
Wagons

All Standard Types

Special Inducements
to Blacksmiths.

Write Today for Agency

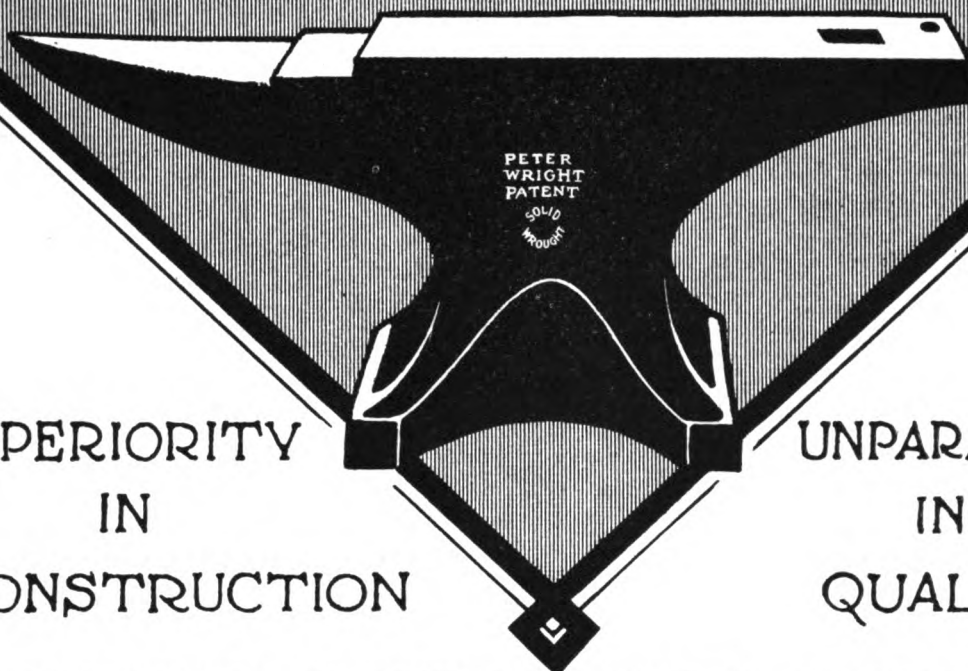
EMPIRE MFG. CO., P.O. Box 304, Quincy, Ill.



Best Gasoline Brazing Forge IN THE WORLD

Thousands sold in last ten years. Four sizes.
Send for Catalog.

The National Cement and Rubber Co.
308 S. St. Clair Street
Toledo, Ohio, U. S. A.



SUPERIORITY
IN
CONSTRUCTION

UNPARALLELED
IN
QUALITY

PETER WRIGHT ANVILS

Agents for the Manufacturers

WIEBUSCH & HILGER, Ltd.

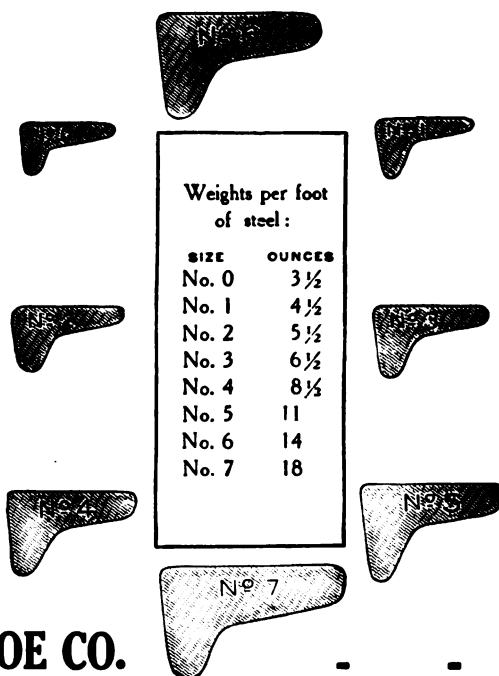
106-110 Lafayette Street

NEW YORK, N. Y.

"B. & M." Patent Ribbed Steel

Sold in the Bar Only, Sizes 0 to 7

Exact Size
of each
Cross Section



Send postal card for leaflet showing photographs of hand made shoes produced with this material.

BRYDEN HORSE SHOE CO.

Catasauqua, Pa.



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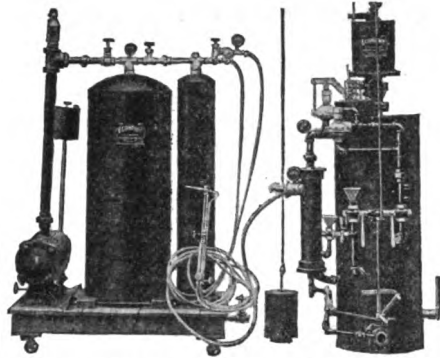
your

chance

to

install

your



ECONOMY WELDING MACHINE

And get into the profitable Auto Repair Business

**This Machine—Self-Contained. Makes Both Gases—Oxygen and Acetylene—Both.
Always On The Job—Never Out Of Gas.**

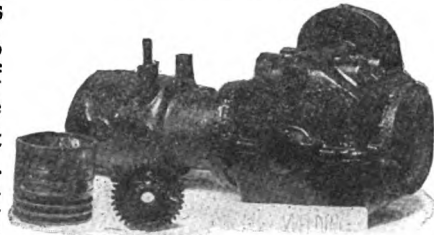
We are the Largest Exclusive Manufacturers of Welding Machines in the United States. The cut above shows our No. 2 Machine with Automatic Feed—for all Blacksmith, Machine Shop, Garage requirements. These pictures show why.

Before Welding



The man who did this job (J. J. Utz, Delavan, Ill.) says: "The wall of the above casting was one half inch thick in most places, and the part I welded weighed 250 pounds. I had 41 cubic feet of oxygen

After Welding



when I started to weld and 15 cubic feet after I finished, and it was some job, too; for the casting was a two-cylinder auto engine, whipped to fragments by a loose connecting rod. There were 26 pieces before I welded it and 6 pieces after welding. I have had my Economy Machine over one year. It's the most useful item in the shop and paid for itself **THE FIRST THREE MONTHS.**"

Economy Welding "Outfit A"

Price, \$75 f.o.b. K. C.

This is the most popular welding "Outfit" in the U. S. The only "Outfit" on the market equipped with the

ECONOMY TORCH

Outfit Consists Of

- | | |
|---|--|
| 1 Economy Welding Torch, with 10 Welding Tips Nos. 1 to 10. | 1 Can Brass, Copper and Bronze Flux. |
| 1 Economy Carbon Remover Torch. | 1 lb. 3-16 in. Cast Iron Welding Rods. |
| 2 13-ft. lengths of hose, with clamps. | 1 lb. 3/4-in. Cast Iron Welding Rods. |
| 1 Acetylene Regulating Valve No. 17. | 1 lb. 5-16 in. Cast Iron Welding Rods. |
| 1 Oxygen Regulating Valve No. 11. | 1 lb. No. 9 Swedish Wire. |
| 1 Pair No. 8 Welders' Spectacles. | 1 lb. 3/4-in. Tobin Bronze Welding Rods. |
| 1 Torch Wrench. | 1 lb. 3/4 in. Aluminum Welding Rods. |
| 1 Can Dicksteph Flux. | 1 Handsome Oak Case. |
| 1 Can Aluminum Flux. | |

1 Set of Instructions on the Care of the Torch and Welding Different Metals.



THIS IS THE KIND of a machine to have—the sort of welder that steps up to the scratch and does its work perfectly and dependably.

WHAT THE ECONOMY WELDING MACHINE did for Mr. Utz it will do for you.

*Write for Prices
and Terms.*

ECONOMY WELDING MACHINE COMPANY, 213 Southwest Blvd., KANSAS CITY, MO.

Western Representatives: Berger & Carter Co., San Francisco and Los Angeles; F. C. Stannard & Co., Salt Lake City, Utah



"BUFFALO" BLACKSMITH TOOLS

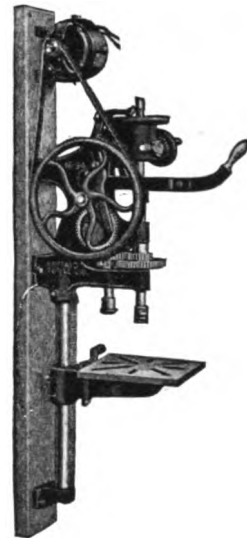
YOU CAN DO IT BETTER WITH
A "BUFFALO"



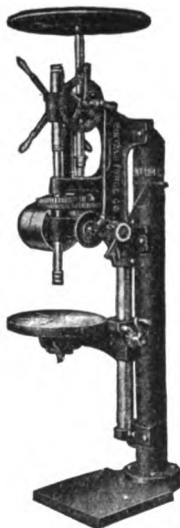
No. 200 Hand Blower
Sizes, 12 in., 14 in., 16 in.



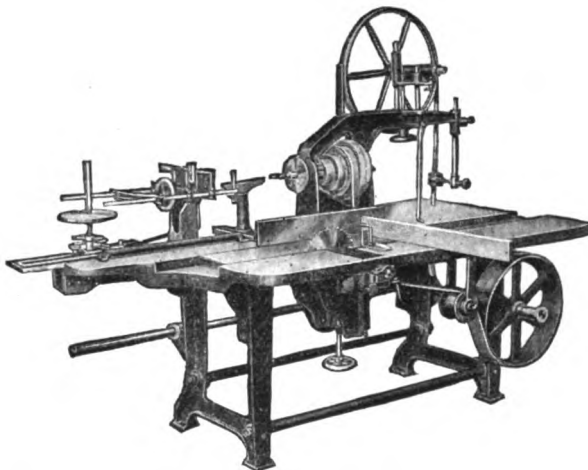
No. 2-E Variable Speed Electric Blower
THE BLOWER WITH A CONSCIENCE



No. 94-E
Capacity, 1½ in. Holes
with ½ H.P. Motor



No. 124-CA
Capacity, 1½ in. Holes
GEAR GUARD FURNISHED



Crain Combination Woodworker



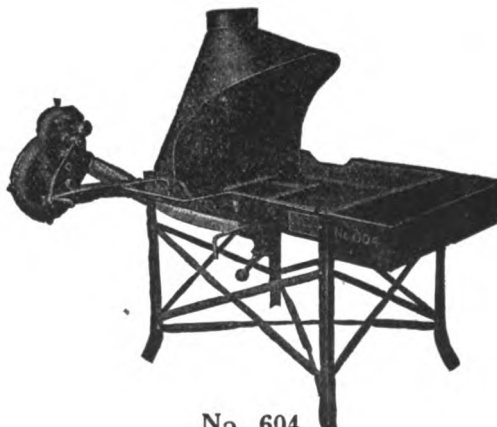
Vulcan Tuyere



Slide Type Blast Gate.



No. 228E
Size, 32 x 44 inches



No. 604
Size 30 x 36 inches.

If interested, you want our new catalog
No. 179-1. Write for it.

Buffalo Forge Company

Buffalo, N. Y., U. S. A.



No. 651.
Size, 23 x 30 inches.



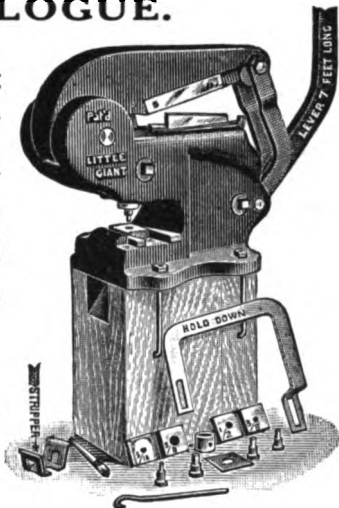
Get the New

Little Giant

TRADE MARK REG.
CATALOGUE.

We have just issued a New Catalogue which completely describes our full line of Punches and Shears.

Write for it AT ONCE.



It will pay you to look it over before buying.

Little Giant Punch & Shear Co.

210 S. Market St.

SPARTA, ILL.

Finish The Job Right

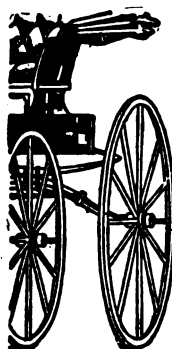
It makes a lot of difference to your customer whether the job looks spick and span. Satisfy him by touching up your repair work—whether automobile or carriage—with

Lowe Brothers Carriage Gloss Paint

the ready-for-use varnish paint. Carriage Gloss dries hard, leaving a rich and lasting finish. One coat is enough—no varnish is needed for finishing. All standard colors, put up in cans of convenient size.

It is economy to use Lowe Brothers Products — they go farther and last longer.

There's a paint for every use. Drop us a line, asking for color cards and full information.



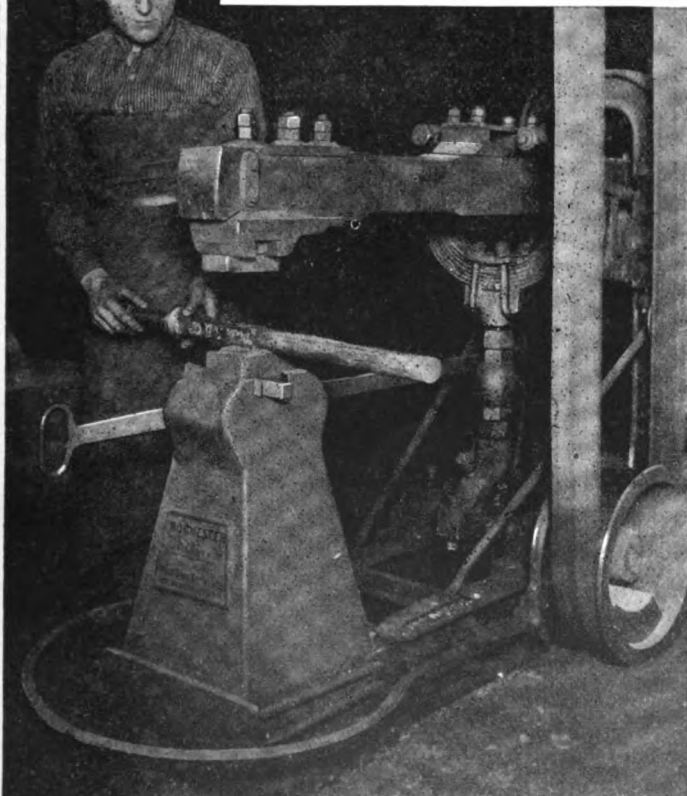
The Lowe Brothers Company

478 E. Third St. Dayton, Ohio

Boston, Jersey City, Chicago, Kansas City, Minneapolis.

Lowe Brothers, Limited, Toronto

"The Best Hammer I Ever Worked On"



says this Blacksmith who has worked beside a ROCHESTER HELVE HAMMER for three years—long enough to know every defect, if it had any.

This Smith favors the ROCHESTER HELVE HAMMER so strongly because, for one reason, it works equally well on heavy or light work. It will draw down four inch round stock to two inches square. The picture shows the hammer finishing up a squared section of an axle—a small job compared with the bigger things one can do with a ROCHESTER HELVE HAMMER.

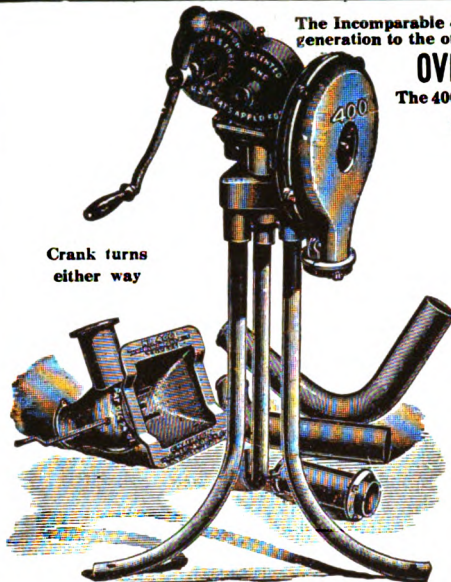
The stroke changing lever is one of the exclusive features of this hammer. It permits the Smith using a long stroke or one that is short and rapid, with light, medium or heavy blows.

You ought to know the other advantages of this hammer. Send us a post card today.

THE WEST TIRE SETTER CO.

ROCHESTER

NEW YORK

Crank turns
either way

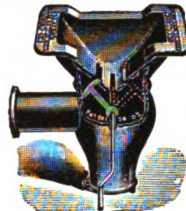
No. 400

The incomparable 400 Blower, the one great Heirloom that will be handed down from one generation to the other. Ask what the owners say. **MADE WITH BALL BEARINGS ONLY.**

OVER 750,000 CHAMPION 400 BLOWERS IN USE.

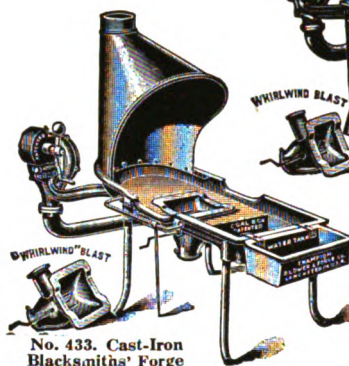
The 400 is the Blower that has Revolutionized the World in making Hand Blast.

**Tuyere Iron That Makes
a Whirlwind Blast**

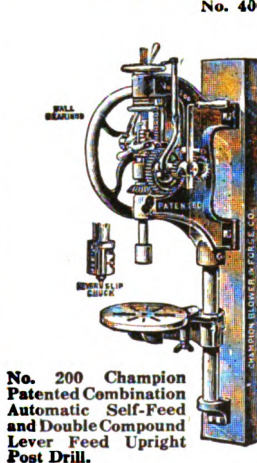
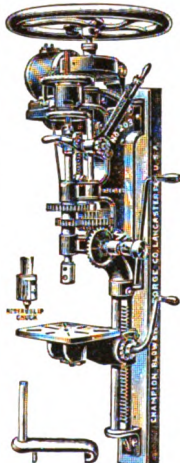
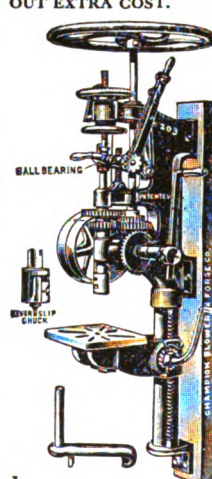


The "Whirlwind" Blast Anti-Clinker, Heavy Nest Tuyere Iron produces a circular, rotary whirlwind blast and concentrates the heat in the tuyere nest, not permitting it to blow up and out of the chimney, therefore makes a hotter fire and heats the iron one third quicker; saving much coal.

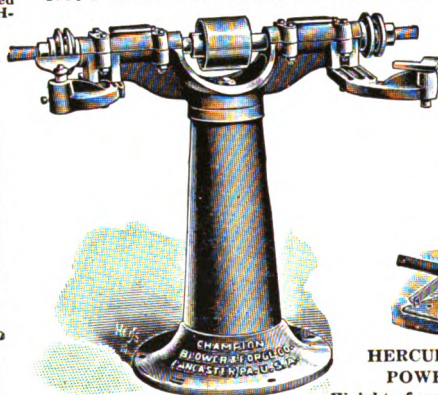
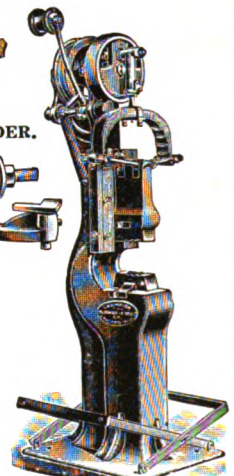
The No. 400 "Whirlwind" Blast, Anti-Clinker, Heavy Nest Tuyere Iron is furnished with all 400 Blowers **WITHOUT EXTRA COST.**

No. 433. Cast-Iron
Blacksmiths' Forge

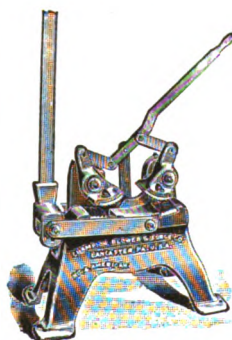
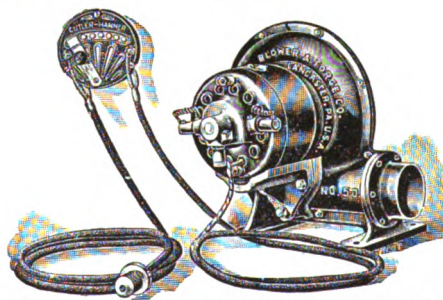
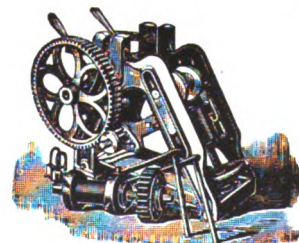
No. 408. Steel Blacksmiths' Forge

No. 200 Champion
Patented Combination
Automatic Self-Feed
and Double Compound
Lever Feed Upright
Post Drill.No. 203. Self-Feed and
Double Compound Lever
Feed, Electrically
Driven Post Drill.No. 203. Self-Feed and
Double Compound Lever
Feed Drill.

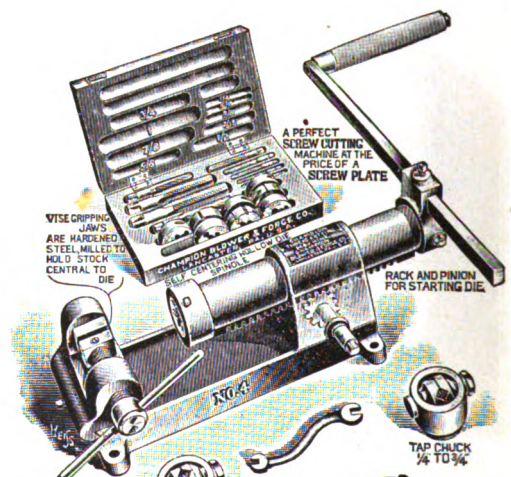
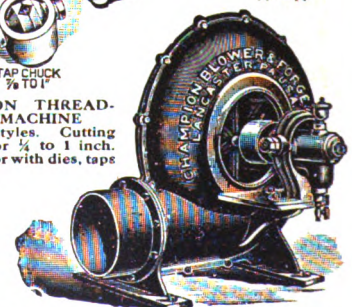
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No. 1 Champion Upright Column
Grinder. Capacity two 18 by 3 inch
wheels.HERCULES PATENTED
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Weight of ram, 65 pounds.
The Power Hammer with the
flexibility in stroke of a Hammer
in a Mechanic's hand.

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Will shrink up to 4x1-inch round
edge tire, and axle up to 1 1/4 in.No. 50. Champion One-Fire Variable Speed Electric
Blacksmith Blower with a Universal Motor for Both
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volts, with Detached Rheostat for six speeds, and
Steel Pressure Blower Case, for all kinds of general
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Made in three sizes.

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the greatest variety of improved Blacksmith tools built under one
control in the world.

THE CHAMPION THREAD-
CUTTING MACHINE
Made in four styles. Cutting
from 1/4 to 3/4, or 1/2 to 1 inch.
With dies only, or with dies, taps
and tap chuck.FAN BLOWERS MADE IN SIZES
UP TO 64 INCHES IN HEIGHT

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Save
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(Continued from page 44)

Plant," Rhode Island Perkins Horse Shoe Co., Valley Falls, R. I.

"Forge Fire Facts," Pennsylvania Coal & Coke Corporation, Whitehall Building, New York City.

"Documentary Evidence," The Pioneer Pole & Shaft Co., Piqua, Ohio.

"Wheel Knowledge," Muncie Wheel Co., Muncie, Ind.

"Well Driller's Book," Keystone Drill Makers, Beaver Falls, Pa.

"How to Treat a Blemished Horse," W. F. Young, P. D. F., 230 Temple Street, Springfield, Mass.

"First Aid in the Upkeep of Automobiles," Wiley & Russell Mfg. Co., Greenfield, Mass.

"Tools For the Automobile," Wells Brothers Company, Greenfield, Mass.

"Repair Book," B. F. Goodrich Co., Akron, Ohio.

"The Care and Repair of Tires," C. A. Shaler Co., 1702 Fourth St., Waupun, Wis.

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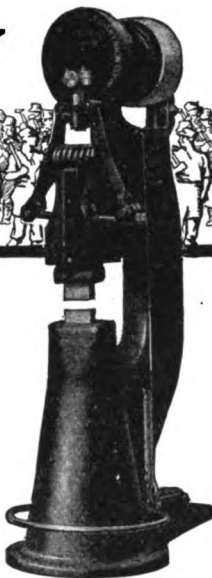
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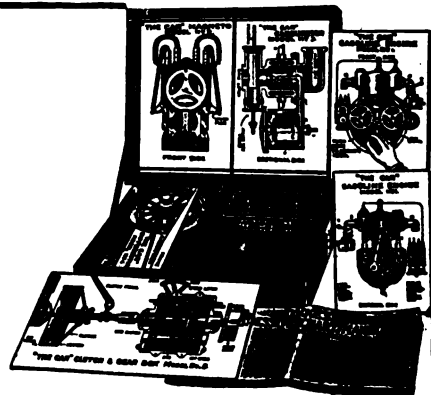
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Winner of the 2:24 Class Trot at
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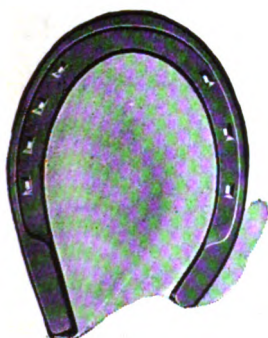
Ch m by Mokover by Moko
Dam Ozegna by Red Hot

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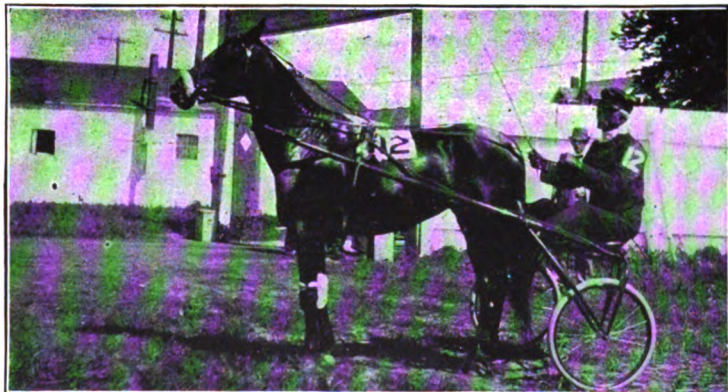
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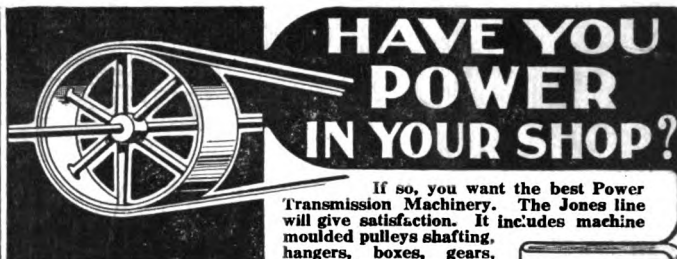
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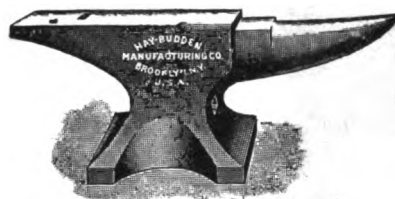
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They do not split or crimp in driving—nor do they break at the head even when the strain is great.

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On July 14th, Judge Humphrey of the District Court of the United States for the Southern District of Ill., rendered a decision in our favor, in the suit we brought against Robert Fissel of Litchfield, Ill., who had bought and has been using a Little Giant Tire Setter.

Our patent is upheld and the decision grants an injunction, an accounting for damages and court costs.

The Suit Was Defended By the Manufacturers

This decision gives to us the exclusive right to manufacture and sell Hydraulic Edge Grip Cold Tire Setters, and our customers the right to use machines made under our patent; all others who make or use similar machines are infringers.

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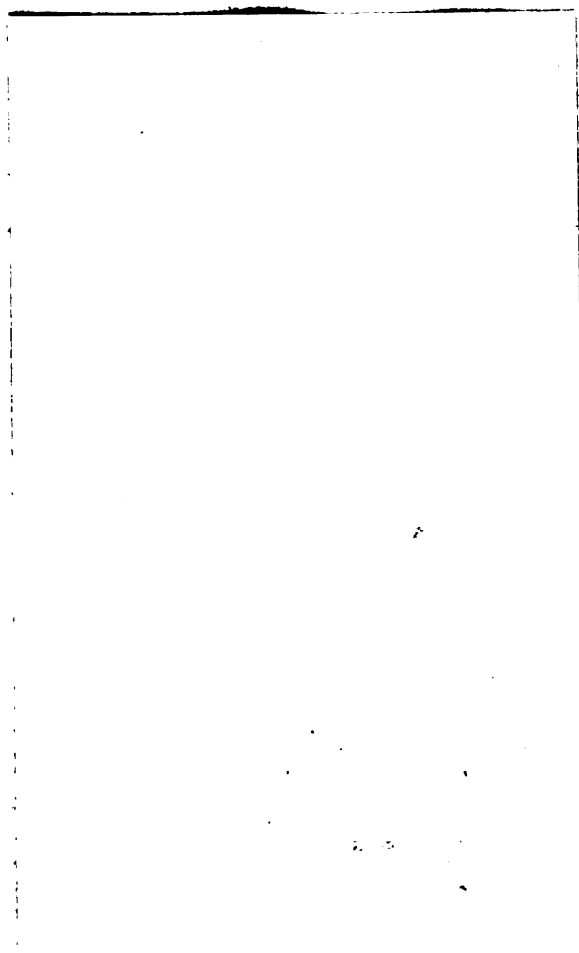
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